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WILD CATS

By COL. J. H. Reinburg, USMCR

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When the CVA catapult officer lowers his raised hand, the airplane will go – somewhere. If everyone has done their homework the aerial weapons system will get safely and comfortably airborne.

THERE was a time in naval aviation when carrier deck launching was more common than catapulting. After World War II, however, mounting experience with jets indicated catapulting was more efficient. As weights and stalling speeds have continued to increase, catapults have become mandatory for precise CVA operations. Today's attack carrier personnel have found the steam catapult to be very satisfactory. In the best interest of safety and efficiency, the catapult and the aircraft it launches must be operated by the book – the NATOPS book to be exact. Occasionally there is a breakdown in the system and – too frequently, a mishap occurs. In the never ending quest to reduce and, hopefully, eliminate aircraft mishaps, experience has shown that steady improvement can be achieved by nit-picking most accidents/incidents. Accordingly, a selection of launching troubles are herewith narrated.

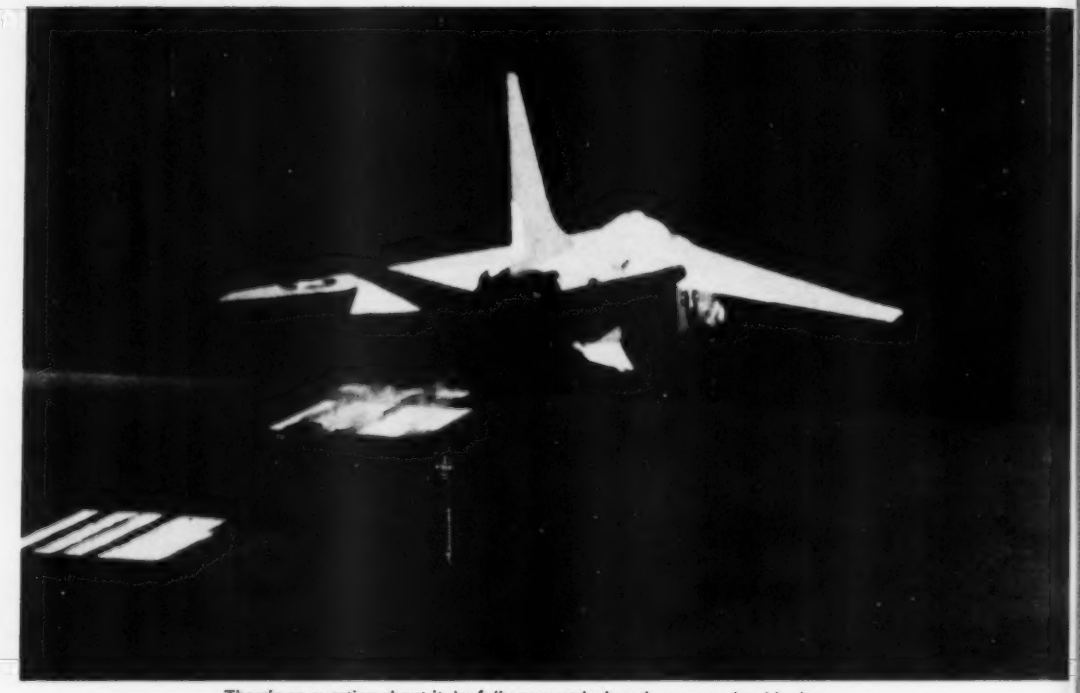
The External Lights Must Illuminate

A fully qualified *Crusader* pilot manned his assigned airplane for a predawn launch. He made all of the proper prelaunch checks except a verification that all of the F-8's external lights worked. After being spotted on the starboard cat, he complied with the turnup signal from the catapult officer. All gages were normal and the engine indicated the required MRT. The pilot then signaled his readiness for launch by flipping the external light master switch. 1

After what seemed to the pilot to be an unusually long delay in firing, he glanced to his left and observed that his port wingtip light was not on. Accordingly, he removed his left hand from the throttle and tried to reach the light switch above the right console.

Meanwhile, the catapult officer observed the tail and port formation light burning but delayed his signal to fire because he had seen no illumination of the port wingtip light. This lighting variation caused him to stare hard at the cockpit for a *red* light indication that the pilot did not want to *go*. When no cancellation signal was noted, and since related lights were ON, the fire signal was given.

Unfortunately, the catapult fired just as the pilot was returning his left hand to the throttle. The accelerating G of the launch prevented his hand from getting back to the power lever which was, therefore, forced into IDLE by the forward momentum. When the excessive G



There's no question about it, be fully prepared when the turnup signal is given.

2

relaxed, the pilot frantically pushed the throttle forward again but he did not keep going into the afterburner position because he thought engine RPM was insufficient. Knowing that 93% was the magic figure for an afterburner light-off, he was sure the engine had not yet accelerated that much and the frantic few seconds did not allow him time to ascertain the exact RPM.

About 1200 ft ahead of the ship at an estimated airspeed of 115 kts, the *Crusader* hit the water in a level attitude. The wheels were still down and the wing UP. Airplane explosion and pilot ejection seemed to occur simultaneously. Miraculously, the pilot survived and was pulled to safety by a rescue helo soon after the mishap.

Obviously, the pilot erred in not being fully prepared when the turnup signal was given. It is questionable if the afterburner could have held the staggering F-8 in the air but considering the last ditch situation, there was nothing to lose by giving it a try.

During some recent carquals, a downed SPN-6 caused cancellation of the planned night operations. One of the pilots (he was not night-qualified) received permission from his boss to return to the beach that night. Confusion and haste immediately set the stage for trouble when the pilot could not immediately find his assigned *Crusader*. After locating his airplane on the hangar deck, the pilot learned that only a carqual fuel load was aboard his plane giving him a weight of 22,500 lbs so he requested a full fuel load. To save time while the additional fuel was being pumped aboard, the pilot entered the F-8 and commenced his prelaunch routine and neglected to insure that the new gross weight of 28,000 lbs was written on the side of the fuselage as per CVA/CVS NATOPS Manual instructions.

After fueling was completed, the airplane was moved up to the flight deck and was started. Following pre-takeoff checks, the pilot radioed Primary Flight Control that his airplane was UP and weighed 28,000 lbs. Accordingly, he received immediate taxi clearance. Meanwhile, the weight board operator checked the F-8 and observed that no chalk marks were written on the side of the plane showing its gross weight. Consequently, he proceeded with his assignment, *assumed* a carqual weight of 22,500 lbs and wrote it on his board without consulting higher authority for approval. The catapult director was on the port side of the *Crusader* while the weight board operator was on the opposite side. The pilot looked at the weight board held up for his viewing. However, before he could acknowledge anything more, taxi requirements diverted his attention. After stopping in the waist catapult position the pilot had another chance to stare at the board. He thought he saw 28,000 lbs so he gave a thumbs-up and *launched he was.*

During the stroke, the pilot was slightly alarmed at abnormal fishtailing but attributed it to waist catapult peculiarities. Upon passing over the bow, however, he realized more speed could be useful so he slapped on the afterburner but he said later he did not feel any power increase. An observer stated that, for a few seconds, the F-8 seemed to hold its own skimming over the waves. Ultimately, however, the "backside of the power curve" could not be overcome so when control could not be maintained and a port bank could not be checked, the pilot punched-out. Although injured, the pilot survived the ejection and was quickly picked up by helicopter.

Several violations of NATOPS instructions were noted to have been the basic cause of this easily preventable mishap. Additionally, the Board pointed out that the existing CVA/CVS NATOPS Manual did not describe a complete and clearly understandable procedure for getting exact aircraft gross weight information to all hands concerned. (Since this accident, a revision of the Manual has clarified this matter.)

A Tragic Weight Mistake

An A-4E pilot attended the squadron briefing before a night carrier mission. Among the information discussed was launch weights and his was 20,500 lbs.

The Air Department for the particular carrier had clear and explicitly worded catapult operating instructions which were written this way: "a. Prior to each launch cycle, the Catapult Officer must obtain the following information: (1) Gross weights of each scheduled airplane as displayed in Flight Deck Control and certified by the Wing Maintenance Officer; (2) Ambient outside air temperature; (3) Minimum wind over the deck requirement, which is forwarded to the Air Officer. b. Fifteen minutes prior to the scheduled launch the Catapult Officer will supply the weight checker with a list of the scheduled airplane gross weights."

There was a breakdown in the instructions and a weight sheet was not furnished to the weight checker. Pressure was on to keep the launch on schedule so the weight checker *assumed* the same poundage of previously fired *Skyhawks*.

The pilot manned his A-4 and when directed, he taxied toward his assigned cat. Upon arrival, he was shown the weight board by the catapult weight checker. It showed 14,500 lbs. As if all were normal, the pilot signified acceptance by the proper light signal; a rotating motion of his hand-held flashlight. Consequently, no time was wasted and the *Skyhawk* was launched. Soon after leaving the bow, the airplane was observed to lose altitude and strike the water in a flat attitude going straight ahead. No radio transmissions were heard from the pilot nor was he seen to eject. And, unfortunately, no pilot or wreckage was recovered.

It will always remain a mystery as to why the pilot accepted the reduced, and therefore, incorrect weight display because there was positive evidence that he knew the specified weight for the mission. Perhaps the weight board had side-light reflections (common to some surfaces) which made the actual comprehension of the lettering difficult and in the interest of not delaying the schedule, he was willing to trust that all was correct. Regardless, the pilot gave the proper signal and a fatal mishap occurred.

Investigation revealed that there had been a breakdown in following the explicitly written catapult launching instruction, wherein, to keep operations on schedule, some weight guessing took place based on recent launches of similar airplanes for such operations.

Catapult officers might reduce or eliminate mishaps, such as the two just related on gross weight errors, if they insure the board is nonreflective and select a weight checker who is a good hand-printer.

Go, No Go Confusion

The port catapult Van Zelm bridle retrieval gear had failed during the launching of an F-8E from the carrier. Next in line was an A-4E and while it was being hooked up, the catapult crew discovered the failure. The bridle was removed from the aircraft while the trouble was investigated. The catapult officer then directed that a *throw-away* bridle be substituted in order to minimize launch delay.

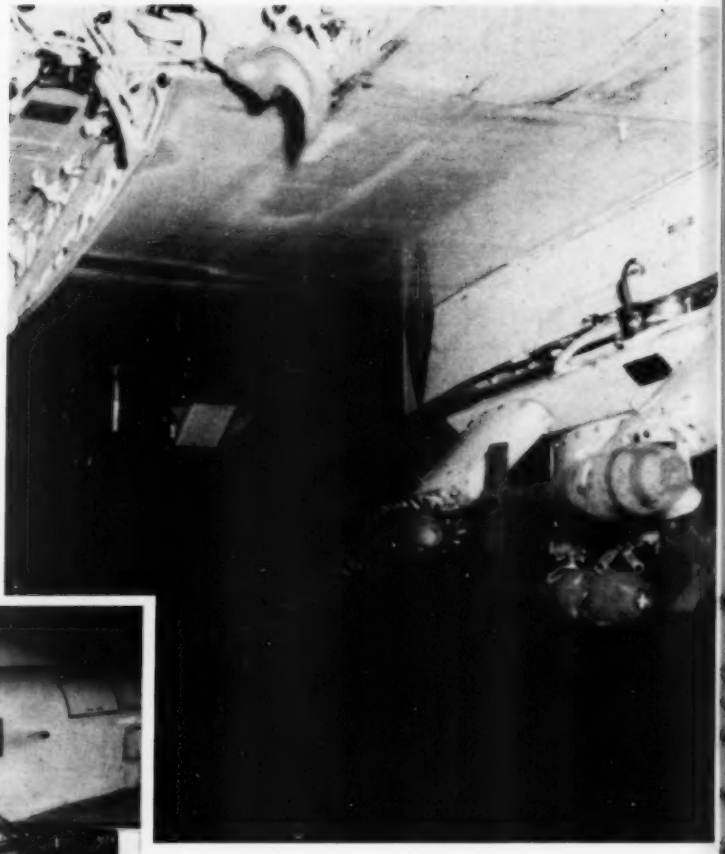
Meanwhile, the starboard catapult was getting ready to launch an airplane so the catapult officer had to officiate and, momentarily, left the crew of the port cat to continue with his corrective orders.

The tempo of the operations motivated the port cat crew to get back on schedule so they re-attached the original bridle upon instructions from the catapult captain who then dashed below to get a knife to cut the nylon lanyard from the bridle.

The catapult officer had a routine launch from the starboard cat and then returned his attention to the ailing port side. In the twilight, it appeared to him that the bridle trouble was fixed and this was further emphasized by the fact that the pilot signaled he was ready for launching. Moreover, the noise of operations interfered with informing the officer that things should be held up until the catapult captain returned to cut the nylon lanyard from the bridle.

So – the *Skyhawk* was launched. Upon retracting his wheels the pilot noted a flashing WHEELS warning light although all three gear indicated up-and-locked. As speed increased in the climb, the pilot felt and heard erratic banging on the underside of his fuselage. Quick inspections by another airborne A-4 pilot revealed, in

A snagged lanyard . . .



. . . and a beatup after fuselage.

the fading light, that the bridle and nylon lanyard had snagged themselves on underside stores. One end of the bridle had imbedded itself in the leading edge of the starboard horizontal stabilizer.

Fortunately, a bingo land base was within range so the *Skyhawk* made a safe landing there.

The catapult officer got the blame for this unusual incident. The board made two recommendations: (1) That higher authority institute a program of standardization for catapult and arresting gear operations similar to that currently in effect for aircraft operations and crewmember training. (2) As an interim measure, higher authority promulgate instructions concerning *throw-away* bridle catapulting, emphasizing the hazard involved if the Van Zelm lanyard is not removed.

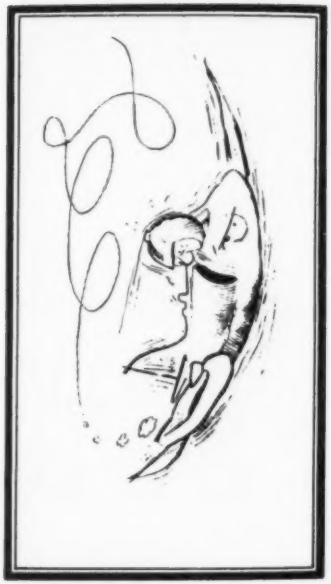
Catapulting Is a Precise Business

The Navy has been catauplting aircraft for about half a century as of this writing. Changes in aircraft design have necessitated changes and improvements in catapult systems. Modern aircraft carrier catapults are extremely versatile, but complex, requiring precise coordination between flight and deck crews. Moreover, catapult operations are often conducted under far from ideal conditions. Noise, darkness and foul weather are among the difficulties frequently encountered. Regardless, catapult operations have an impressive record of success and techniques are being improved all the time. Human failings still account for the majority of catapult mishaps so it pays to follow standard operating procedures and NATOPS to minimize the hazards associated with cat ops.

A new and up to date CVA/CVS NATOPS Manual has recently be issued to the Fleet. It is dated 1 January 1968. Be sure to read it from cover to cover because there have been many changes.

BIBB'S UNCONTESTABLE MODERN LAWS OF AVIATION

By Ben Bibb



It is chilling fact that man's environment surrounds him with a throng of automatic and unstoppable actions which calmly, casually and callously just happen, given the proper setting.

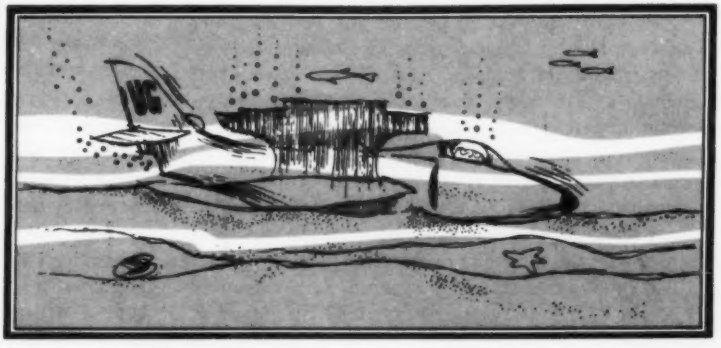
LAW: The height above terrain of the ordinary power line is invariably exactly equal to that of the nearest approaching helicopter.

Obviously: Statistics alone will prove this law. On a given day the number of helicopters snared by ordinary power lines is numerically equal to the number of helicopters approaching same. It is amazing that no one has previously stated this glaringly apparent law.

LAW: A buckle in an aircraft wing is often less useful than one in a seat belt.

LAW: Excavations near runways or taxiways quickly become magnetized and strongly attract airplanes despite pilots' best efforts.

LAW: Airplanes are configured to operate through air and will not normally function nearly as efficiently through water or earth. ◄



A Review of COLLISION AVOIDANCE SYSTEMS Development

FOR SEVERAL years we have been reading and hearing about devices and systems under development which will decrease or prevent the danger of midair collisions between aircraft. These devices or systems have come to be referred to as CASs (collision avoidance systems) or PWIs (proximity warning indicators).

The prime incentive to develop such systems is the protection of high-capacity passenger carrying commercial aircraft. As bad as a collision between two military aircraft might be, it could not be compared in terms of potential fatalities with a midair involving a commercial passenger transport. And, with the almost daily announcement of newer, larger passenger aircraft, a midair collision *can be imagined* with a potential of more than 800 fatalities. This most certainly provides a *strong* incentive for collision avoidance.

Of what particular interest is the development of CASs or PWIs to the average Navy pilot? The answer, of course, is plenty. Even though many, if not most, Navy flights operate in warning, restricted or intensive training areas, a substantial number operate in the same environmennt as civil aircraft. But, regardless of *where* the Navy pilot operates, any effective system of midair collision avoidance should be of great interest.

System Specifications Not Well-defined

Final specifications have not yet been written for either a CAS or PWI, although FAA has provided some tentative requirements. It appears that the requirements to be met by either a CAS or PWI can only be deduced by a thorough study of the present and forecast development of air traffic control. That is, the present system of air traffic control is being developed as an integrated *National Airways System* and a knowledge of its planned development is requisite to determination of specifications for a major component of the system.

Collision Avoidance Systems

A CAS must not only be compatible with the air control system, but it appears that it must also be developed in a manner to assume a definite positive airways control function. As a component of the National Airways System, it will be competing for money with other components and it must be worthy.

Numerous companies are engaged in the development of systems and devices. Some might be characterized as CASs while others are PWIs. But, in both cases, two types of systems or devices – *cooperative* and *noncooperative* – are under consideration. A *cooperative* system may be defined as one which requires cooperation of devices or equipment installed in other aircraft; a *noncooperative* system or device does not. That is, it is self-contained.

Of the two, a cooperative system seems to be the most feasible for a CAS which may be expected to:

- Provide for detection of other aircraft.
- Evaluate the other aircraft for collision potential.
- Compute appropriate evasive maneuvers if a collision potential exists.
- Initiate, or advise the pilot to initiate, evasive maneuvers in time to avoid the collision hazard posed by the other aircraft.

Now, let's consider further the expected CAS role as a versatile and hard-working component of the air control system – responsible for functions in addition to collision avoidance. As such, CAS *must* interface with the airways control system. This is apparent when you consider that the CAS will issue collision avoidance instruction (which must be obeyed if the system is to be effective) to a pilot who may also be under the positive control of an FAA air controller. In this context,

development of the CAS is inseparable from the development of the National Airways System.

Another reason a *cooperative* system is now receiving the most attention in CAS development is a belief by many that decentralized air traffic control is the wave of the future. If this belief proves correct, a *cooperative* system has the most capability to provide an output of the navigational information which would then be necessary.

The theory of one front-running system now under development calls for extremely accurate clocks in order that interference-free microwave radio broadcasts may be made by up to 2000 aircraft on a time-sharing basis within a narrow frequency range, during each three-second period. An atomic clock is the only known clock with the capability of independently maintaining the required degree of accuracy. This clock, however, appears to be prohibitively expensive at the present time. An alternative to the expensive atomic clock is to establish a network of ground stations in order to keep less expensive clocks synchronized to the desired degree of accuracy – also very expensive! Another alternative is to use cheaper clocks and let aircraft synchronize each other to a common time. This appears to be relatively inexpensive and would provide an answer to what is perhaps the most perplexing technical problem facing development of a CAS, but . . . the time produced by such a system would not be real time and real time is essential if the information produced by a CAS is to also be used for navigational purposes.

As already noted, many foresee decentralized air traffic control in the future, and a CAS which is already cranking out range, speed, altitude and vertical speed of all aircraft, and which is capable of being monitored by all other aircraft and ground stations, is a natural for decentralized air traffic control. Such a CAS could also provide station-keeping information and an instrument landing system capability. Hence, it is expected that the versatility of such a time-frequency system using real time will prove so attractive that the accurate-time/cost problem will be satisfactorily resolved.

Be that as it may, an operational CAS as discussed here is x number of years in the future. So what's to be done in the meantime?

The Eyes Still Have It

It is evident that collision avoidance will remain the problem and responsibility of the individual pilot for some time. And, as in the past, the eyes have it! They are going to continue to play a central role in avoiding collisions. However, it is recognized that the eye has serious limitations in performing this job (see January 1967 APPROACH for an informative discussion on the role of the eye in preventing midair collisions).

The pilot will of course continue to receive the benefit of ground radar information. This assistance will no doubt be further expanded in the future and should become more valuable as more aircraft – IFR and VFR – are radar monitored and provided with traffic advisory service.

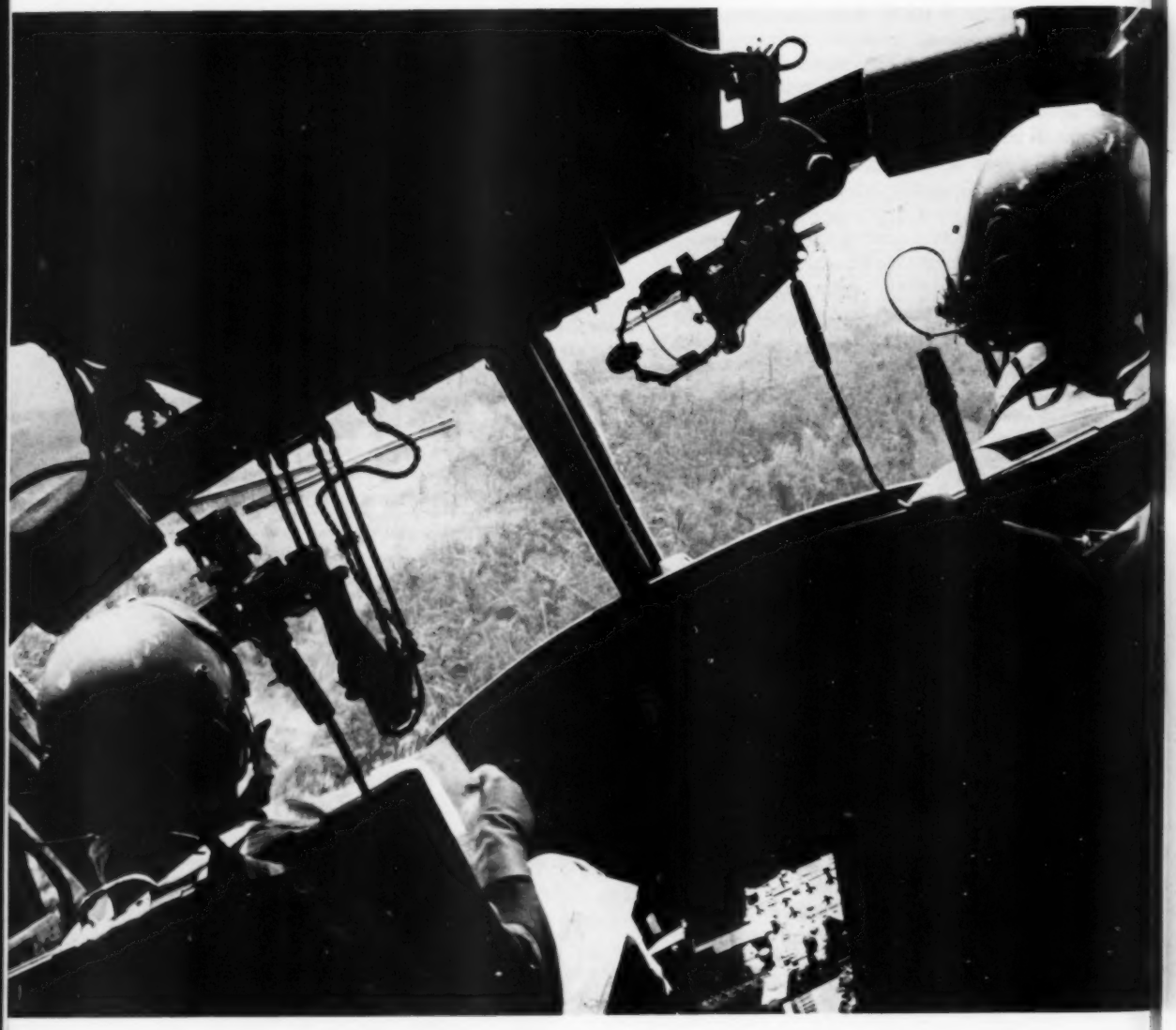
The pilot also enjoys other aids in varying degrees such as high-visibility paints, anticollision lights, etc., but more aids are needed by the pilot and needed now. This need will increase as air traffic increases.

The Role of the PWI

PWIs appear destined to fill the gap between the present and arrival of the refined, sophisticated CAS of the future. Perhaps PWIs may then remain to complement the CASs. Several PWIs are now under development or test by a number of companies. These include a promising infrared system – and a system using nuclear radiations is now under development. As a point of interest, most of the PWIs under development are *noncooperative* types, that is, self-contained systems.

What to do *Now*

Until the time arrives when you can man an aircraft with a CAS which is capable of performing the functions of an ATC controller and autopilot combined, at least part of the time, it will pay you well to keep your head on a swivel – just like your primary flight instructor said. ◄



An Evening Patrol

THE crewmembers of the light attack helo (UH-1B) fireteam felt pretty good. They had just completed their evening patrol after having had a brief encounter with Charlie. Their ordnance expended, it was a time to relax for a few minutes before entry into the LST landing pattern. At the conclusion of the firefight, the gunners had policed the after cabin, replaced the spare M60 barrels into their racks, picked up as much brass as possible, and strapped themselves into their jump seats using their seat belts in addition to the gunners' "monkey" belts.

Flying toward homeplate the fireteam leader directed the other aircraft to land first due to a lower fuel state. The AHAC (Attack Helicopter Aircraft Commander) of the wing ship was a split tour LTJG and a fine, young aviator. The copilot was a LCDR with considerable flight time but new in-country and new in model.

The night was black as most (Mekong) Delta nights are during the monsoon season, but the ship's deck lights were bright and clear and the Pathfinder (Angle of Approach Light M16-L-19891 (AER)) was on and set. It was a good chance for the copilot to make his first night LST landing. The approach started normally at 1200 ft above the ship with a slow, circling descent to a left abeam position at 500 ft. Downwind was extended and the Pathfinder beam was picked up green on final at 300 ft at 60 knots. Lineup was good and the approach, except for some roughness of a pilot not totally familiar with the *Huey's* reactions, could be called normal. The glide slope indicator turned red close in. The AHAC called for power, which was promptly applied by the copilot, returning them to the glide slope. However, a turn to the right developed and full left rudder could not stop it. The AHAC took control of the aircraft and crossed the deck edge at a 90-degree angle – the rudder still had no controlling effect. Two and a half turns were made before the helo went over the side of the ship, narrowly missing the forward antenna and port 40mm gunmount, heading toward the muddy water of the river.

Somehow, through exceptional skill and a bit of luck, the AHAC managed to regain forward speed, with slipstream effect, and altitude despite lack of visual reference or horizon. Quick checking into flight characteristics revealed that the rudder operation was apparently normal. Diversion to a land base was out of the question due to low fuel state, so the decision was made to execute a no-hover landing to the LST deck.

Approach was commenced and was normal until touchdown when, again, there was inadequate left rudder. A 15-degree right turn was made on deck but was stopped, after lowering collective, by the friction between the skids and the flight deck.

Detachment maintenance personnel quickly investigated to determine the cause of the tail rotor control failure. From pitch change link to hydraulic servo cylinder everything was normal. As the deck plates were being lifted the cause was discovered: a screwdriver had fallen out of the door gunner's tool rack, on the back of the pilot's seat, and had become wedged between the right rudder pedal and the cockpit deck.

Moral: Those aviators actively engaged in combat must continue to remember that Charlie isn't the only enemy, and that FOD can be found in places other than jet intakes. Combat aircrews must remain constantly alert for tools, weapons, spent brass, and other items adrift in the aircraft, as alert as they are for enemy movement and fire – both can bring down an aircraft.

The FOD indicated below very nearly caused an unhappy ending to an otherwise successful mission.

Short Snorts

Fail to think SAFETY and you aren't as safe as you think.

The Tender Trap

RECENTLY, a military magazine contained an explanation of an "enroute penetration." It was described as "...a descent from your flight level to the initial penetration altitude, terminating over the navaid where you will begin an approach using FLIP high altitude instrument approach charts..." Another military publication, in discussing a turbojet enroute descent informed pilots that this service should be specified to the controller by using the following phraseology "request enroute penetration to (destination airport)." (There is an "enroute descent" but there is no special meaning attached to the phrase "enroute penetration.") Isn't it amazing how easy it is to build a trap? Start varying from the standard – give a little different meaning to a procedure or regulation, and in a short while (through association) you too can build a trap.

T-2A Peculiarities

A flight of six T-2As were scheduled for some formation tactics while enroute to another field for FMLP. Just under a half hour after takeoff, they made their break, from formation, over the destination. Five of the *Buckeyes* were in right echelon and No. 4 was flying more erratically than normal. This caused No. 5 to make large power changes to maintain his position. Just before the planes broke, No. 5 noticed he had to reduce his power to 60 percent RPM. He glanced at the field and the breaking formation simultaneous while sensing a need to add power. The aircraft did not respond to his forward movement of the throttle and he glanced back at his instruments. RPM had dropped off to 40 percent and EGT was abnormally low at 325°. Jockeying of the throttle produced no change in RPM. The pilot instantly knew that his 500 ft of altitude left little time for troubleshooting. He transmitted that he had a flameout and pulled his nose up to get clear of the flight and initiated the ejection sequence. He parachuted safely to earth.

The aircraft was totally destroyed upon impact. The most probable cause of the flameout was determined to be a malfunctioning fuel manifold dump valve in the engine fuel distribution system. Experience with the *Buckeye* has indicated that this valve is subject to failure when rapid throttle changes are induced.

"I know they fly through hangars in the movies but they make sure the doors are open."

Perspective Problems

In order to demonstrate landing techniques to a midshipman he was squiring on an indoctrination flight, the instructor pilot in the front seat of a T-34 set up for a normal full flap approach.

At the 180 his airspeed was 80 kts. The 90 was slightly deep with 65 kts airspeed and 200 ft indicated altitude, but the pilot later stated that the sink rate and nose attitude appeared normal.

On final the instructor decided that the landing would be short of the prescribed touchdown point, so he initiated a waveoff at 15 to 20 ft estimated altitude. He added power and simultaneously raised the nose. The pilot later confirmed that at this point he still felt that nose attitude was normal. The laws of aerodynamics disagreed, however, and the aircraft stalled, rolled to

the left and the port wingtip and main mount struck the ground at the same time. The aircraft skidded off the runway and came to a stop in the dirt. Substantial damage to the aircraft resulted, but fortunately neither the pilot nor the midshipman was hurt.

The flaw in technique evident here came about with the instructor pilot's reluctance to realize the difference in the appearance of nose attitude when viewed from the front and rear cockpits. If no compensation is applied for the different perspective, the aircraft will be placed at a greater angle-of-attack when the pilot assumes the same nose attitude in the front cockpit as he normally would in the rear. This was apparently the case in this incident since the airspeed at the 90 was 65 kts instead of the recommended 80 and the pilot still felt that his nose attitude was normal.

The instructor also used improper techinque in the waveoff when he applied full power and simultaneously raised the nose. This only aggravated his already nose-high condition and caused the aircraft to stall.

The pilot's disregard for approach speeds and his failure to cross-check attitude instruments throughout the approach was cited by one endorser as an example of complacency and overconfidence.

Stowage Problems

While preparing to depart on the return leg of a cross-country flight, the pilot of a TF-9J instructed the transient line crew to stow his winter flight jacket in the aircraft's port ammo can compartment. (The ammo can had been removed in accordance with current directives.)

By the time he arrived at his destination (following two enroute refueling stops) the sleeve of the jacket had worked its way into the nose wheel well via the open inboard end of the ammo compartment and had become entangled with the nose gear locking mechanism. When the unwary pilot dropped the gear, an UNSAFE nose wheel indication resulted.

After several cycles of the landing gear and use of the emergency air bottle, the nose gear still indicated UNSAFE although the gear itself was visually checked to be down-and-locked. The apprehensive pilot subsequently made a successful landing.

Here's a good example to show the results of improperly stowed luggage and loose gear. Use of the ammo compartment in an F-9 for loose gear is an unsafe practice and creates a definite accident potential. Avoid it!

Blindman's Buff

ALL commands share in the responsibility of preventing midair collisions. The training command recently experienced one from which a lesson or two might be learned. Three AF-9Js took off for some authorized combat tactics. The profile was canned and called for one of the fighters to be jumped by coordinated tactics of the other two.

After several dives and turns, two of the planes got into a high G turn-and-roll dogfight. A few gyrations later, one undershot the other causing it to be in the other's blind spot, in close proximity. The top man lifted each wing alternately in an attempt to establish visual contact. This was followed by the rapid appearance of the lower plane in front of him. This instantly resulted in transferring the inflight refueling probe (sans fuel) from the top fighter into the horizontal stabilizer of the other. Fortunately, the collision merely inflicted minor damage by ruffling the tail feathers of one of the aircraft. Both planes returned safely to earth.

In daytime tactics, the attacker should never lose sight of any aircraft in close proximity to him. In all cases know and understand all facts of relative motion, while keeping your head on a swivel.

SNAFU on the Deck

Carrier launch flight operations were in progress. After starting up his A-4E the pilot noted that his all-attitude indicator had erected 30 degrees nose down and squadron SOP dictated such a malfunction was a mandatory "down" for night flying. He informed carrier departure control by radio that his aircraft was unflyable. Departure control did not pass the word to the flight deck crew who proceeded to attempt to spot the *Skyhawk* on the port catapult. The pilot then got through to the flight deck director via hand signals.

Word was passed to "pull forward" the A-4E to get a ready deck; therefore he was motioned toward the starboard catapult track for spotting near the bow. As the *Skyhawk's* nose wheel passed over the starboard catapult, the shuttle suddenly flipped forward and sheared the NLG from the aircraft.

Investigation revealed safety precautions were not strictly adhered to and the shuttle was sent forward without receiving the "all clear" signal. As a result of this accident, the ship has initiated an improved system of communications for alerting deck personnel of such hazards.

This and similar deck accidents/incidents point out the need for continuous alertness to detect possible breakdowns in deck communications. ◄

PLANNING for the Unplanned

"IT SEEMS to be generally recognized that IFR flights by tactical aircraft are somewhat marginal affairs; there is no room to spread out charts for detailed flight following; there are no fuel flow data charts; but rather only a REST computer which has marked limitations in the information which it provides; the navigation aids and communications systems are only one deep and inadequately designed and located for optimum response to the pilot's need; there is precious little time available for the pilot to operate these devices and still fly his aircraft; and finally, there is, generally speaking, no fuel to spare."

So wrote an officer of Flag rank when endorsing the report of a T-33B aircraft accident which claimed the lives of two young pilots.

The aircraft involved in this accident, Navy 12345, was scheduled as a combined navigational training and logistics flight from NAS North to NAS South and return. The pilot arrived at his destination airport safely, ate a light lunch, had his aircraft serviced, and took off shortly before dark for the return flight to NAS North. At the pilot's request, the entire flight (with an ETE of about 2 hours) was conducted at FL 240, by radar vectors from the enroute centers. Upon arrival in the Terminal Center Area, he was offered an enroute descent which he accepted, requesting a GCA to NAS North.

Descents were given Navy 12345 in steps and at 12,000 ft he was cleared to the Nearhome intersection and informed that there would be a delay. Upon being given an expected approach time, he advised Terminal Center Radar that he would be unable to hold because he had only 20 minutes of fuel remaining.

Shortly thereafter, the pilot was advised that *NAS North was now below GCA minimums,* and was asked if he desired to land at Nearby Municipal Airport. He replied in the affirmative, and was handed off to Nearby Approach Control for radar vectors and a GCA to

Nearby Municipal Airport.

At this time, the aircraft was 22 miles directly downwind of runway 32, at 11,000 ft. He could have been vectored straight in to runway 32 (11,600 ft runway), however, approach control elected to vector Navy 12345 in a normal traffic pattern for runway 14.

Upon turning final, the pilot was advised that the precision GCA controller was unable to observe a radar return. The pilot advised the controller that he was almost out of fuel and must land on this approach. The search radar controller therefore continued to vector Navy 12345 towards the runway, progressively assigning lower altitudes until the aircraft was down to about 250 ft above ground level. Approximately two miles from the end of the runway, the pilot was given a turn and upon rollout on heading, was advised that the field was straight ahead, one mile.

The pilot acknowledged – and crashed moments later, one-third mile from the runway. There was no evidence of any attempted ejection and both pilots received fatal injuries.

At this point you may wish to take issue with that portion of the AAR endorsement which describes IFR flights by tactical aircraft as "somewhat marginal affairs," preferring instead to detail the many obvious failings of this pilot as the cause of this particular accident. The pilot did, indeed, commit many gross errors during the flight, even failing to declare an emergency. This, and the many other errors committed by the pilot were duly noted by the AAR Board and subsequent endorsers, but the Flag rank endorser already mentioned sought to look beyond the errors of this individual to consider the facts of cross-country flying on a broader scale.

The endorsing officer's comments are lengthy, but the two salient points are these:

- The degree of air traffic control made necessary by the congestion in today's crowded skies often operates to wrest the initiative for the conduct of the flight away from the unwary pilot.

- The pilot, once airborne, often finds it necessary to devote literally all his time responding to the air traffic control system, leaving no time to adequately cope with deviations from the planned flight, an occurrence becoming more and more frequent.

The endorser specifically refers to tactical aircraft, noting their limited fuel endurance and lack of cockpit facilities for airborne flight following and flight planning. However, his comments are appropriate to any IFR flight involving Navy aircraft, except perhaps the larger transport type. While some aircraft have more cockpit space and more fuel reserve than others, they all have a finite endurance, and the pilot must have preplanned his flight to the extent that he is prepared to exercise his judgment and fulfill his "take charge" responsibilities when indicated – before an emergency develops.

A case is known of a pilot arriving at penetration altitude (FL 200) over destination with 3500 lbs of fuel. He was cleared by approach control for "Descent by random vectors" and after being continuously vectored by controllers, in IFR conditions, for approximately one hour, he arrived on deck at destination with less than 800 lbs – after a declaration of low fuel state. The moral of this story is that the handsome fuel reserve usually available in prop aircraft upon arrival in the destination area does not necessarily guarantee a safe landing. The demands of air traffic separation can easily place the pilot of a prop plane in the same critical fuel state that jet pilots more frequently encounter.

The endorser went on to state: "To say that such flights (by tactical aircraft) are marginal is not to say that they need be unsafe. By demanding that the pilot, in effect 'rehearse' his flight prior to takeoff, through meticulous flight planning, he (the pilot) can with only a reasonable margin of extra fuel, conduct his flight safely, *providing he is permitted to stick to his script.*"

Providing he is permitted to stick to his script. That is the crux of the matter. The assumption that the pilot will have a flight plan when he takes off is a reasonable one, but it is never safe to assume that he will be able to stick to the script.

Take the matter of radar vectors. These can be of valuable assistance to the pilot, but their use eventually negates the pilot's usual preplanning, and for the unwary pilot, they seriously impair his capability to influence his future flight. Radar vectors are frequently employed to position the pilot for a final approach and are a great help, but it must also be recognized that they are sometimes employed for purposes of traffic separation, and the pilot must keep abreast of the situation to the extent that he recognizes when he is making sufficient progress toward an approach and when he is, in effect, holding. Holding, that time-honored device for separating traffic, appears to be required more and more, with periods up to 60 minutes not unusual. The fuel requirements cited in NATOPS realistically provide little or no fuel for holding and the pilot must be continuously aware of his limitations and alternate courses of action.

Inflight communications are worthy of comment. Discrete radio frequencies usually provide better communications than did older systems, but the net effect upon the pilot frequently is to take up much or all of his time in "working" the radio. This is partially

recognized by the yet all-too-infrequent installation of the SFA (single frequency approach). On the day of the accident, another pilot was directed by one controller to shift between the same two frequencies four times in rapid succession before satisfactory contact was finally established.

An analysis of the communication tapes in the cited accident showed that for 32 minutes prior to the crash, the pilot devoted nearly every moment to responding to the communications requirements of the air traffic control system, and these tapes do not show the many navigational radio manipulations which were also obviously required of the pilot. It might be said that 32 minutes before the crash, the pilot was not yet in trouble becuase he was within 50 miles of his alternate airport, with 32 minutes of fuel left, but sometime during that 32 minutes he reached a point where it was necessary for him to seize the initiative and "take charge" of the conduct of his flight. Failing to recognize this point, he also failed to take charge. Either he was too overloaded with the demands of the air traffic control system, or was simply ill-prepared for the ordinary demands of cross-country flying – or both. In any event, at some point during this 32-minute period, he effectively lost control of his flight.

Altitude changes enroute are another point worth considering. The possibility that ascents to altitude will be delayed upon climb-out, or that accelerated descents will be ordered, or at least offered, prior to destination must be considered by the pilot. Such deviations from the planned flight eat into fuel reserves, and wreak havoc with the calculations upon which the flight planning is based, particularly if they are conducted at arbitrary airspeeds and descent rates.

In summary, there is an ever-increasing demand by the air traffic control system upon the pilot tending to take from him the initiative for the control of his flight. These are facts of life made necessary by the increasingly congested airspace. Nevertheless, the pilot must never forget that the ultimate responsibility for the flight rests in his hands. Being forewarned, it is incumbent upon the pilot to not only rehearse his flight through meticulous flight planning prior to takeoff, but to preplan the contingencies which are sure to arise while airborne. The demands placed upon the pilot while inflight can easily create a situation where there is literally no time available for flight planning. If flight plan deviations are being directed or suggested at the same time, the flight can turn to worms, unless these contingencies have been preplanned.

The only logical approach to present-day, IFR cross-country flying is to plan, plan and preplan in order to have all the facts assembled in a manner that they can be used immediately to support the decision-making that invariably becomes necessary during an IFR cross-country flight. ◄

WHAT PRICE PROFESSIONALISM

A VERY popular quote on leadership is attributed to the great American historian, Douglas Southall Freeman:

"Know your stuff.
Know your men.
Take care of them."

Helicopters with their unique ability to hover, fly sidewards and backwards still demand a top brand of professionalism. The need for professionalism is not limited to individual pilots. It must extend to all levels of naval aviation. In the accident briefs discussed below not only is the leadership questionable but also professionalism is doubtful.

• A flight plan was filed between two stateside airports calling for about a two-hour flight. (Regular cruise would exhaust the fuel in about two hours.) As expected, headwinds necessitated a diversion. However, when the pilot selected an alternate short of his destination he didn't realize that he would lose one engine a few minutes out due to fuel starvation and would lose the other on his approach. The helo was landed unsuccessfully – substantial damage.

• The fuel warning light had been on a few minutes as the pilot became airborne for home base, which was less than 10 miles away. After the accident it was determined that the bird had about 100 lbs of fuel when he departed the air station for home. When the engines flamed out the helo was landed unsuccessfully – substantial damage.

• When flying in mountains special techniques are usually called for. In this instance the pilot made an approach to an area from which there was no waveoff route. The circumstances of the hop all worked against the pilot. He was heavy. There was only a light wind (direction unknown). His hover was out of ground effect. Once committed his sink rate became excessive. The helo was landed unsuccessfully – strike damage.

The helicopters involved were big birds at almost $2,000,000 a copy. As one SAR pilot just returned from Vietnam said, "That's a lot of San Miguel."

Persistence Pays

WHEN he raised the gear handle as part of his recovery from a practice approach to a dirty stall, the pilot of an S-2D found that the main mounts wouldn't budge. He placed the gear handle DOWN immediately but the warning light in the handle stayed ON and the nose gear indication went to barber pole. A glance in the nacelle mirror confirmed that the nose wheel was trailing.

The hydraulic pressures read ZERO on both sides, but there was no evidence of a leak anywhere on the nacelles. After the copilot tried to use the hand pump and couldn't develop any pressure, the instructor pilot checked the hydraulic reservoir and found that it was empty. Two quarts of fluid were added to the emergency reservoir as the copilot pumped away but the nose gear still remained at TRAIL.

Radio contact was established with the squadron safety officer at the field and with his counsel several attempts were made to get the mount down. After a number of suggested solutions failed, including application of positive G, the pilots were instructed to cut a hole through the cockpit decking for access, then to try to pry the reluctant mount into position.

After hacking a hole five inches square through the deck, the pilots found that the emergency pump handle (the longest tool available) was too short to be effective in moving the strut. They tried extending the pump handle using an arm rest from one of the seats, and when this proved to be too short, they lashed on two arm rests, one on either end of the pump handle, using lanyards from equipment in their mae wests.

Now they could push the nose gear all the way down, but with the jury-rigged arrangement they couldn't exert enough force on the strut to lock it in place.

With daylight fast fading, they positioned the extended pump handle just above the shimmy damper and by pushing down, began to swing the nose gear like a pendulum. After a few lusty pushes enough momentum was built up to lock the mount all the way forward. The mount still indicated UNSAFE, but pressure on the trailing arm finally swung the overcenter lock into place. The warning light in the handle then went out and the elusive SAFE indication popped up on the wheels position indicator.

A visual check of the landing gear was made by pilots of another squadron aircraft, who reported that all three gear appeared to be DOWN and LOCKED.

As a precautionary measure the pilot made a no-flap landing to a foamed runway and held the nose wheel off the deck as long as he could. When he finally touched it down the mount held and with a great deal of relief, the landing was logged as uneventful.

Failure of the drag brace on the starboard main mount set up the problem, which was compounded throughout by the onset of darkness and a threatening rain cloud that hung over the edge of the field. The pilots were commended for their ingenuity and professional handling of the emergency.

Persistence does pay off. ◄

Rotor Vortex

With all the attendant hazards of ground operations at our major air stations and airports, pilots and tower operators have another dangerous condition to worry about – helicopter rotor wash.

Aviators have been cautioned since time immemorial, by their instructors, not to follow another plane too closely. Yet every aviator on occasion has found himself sucked-in by turbulence from a plane in front. Now to add to life's little irritants there will be wonderings if some chopper has left a few choice vortex cores behind.

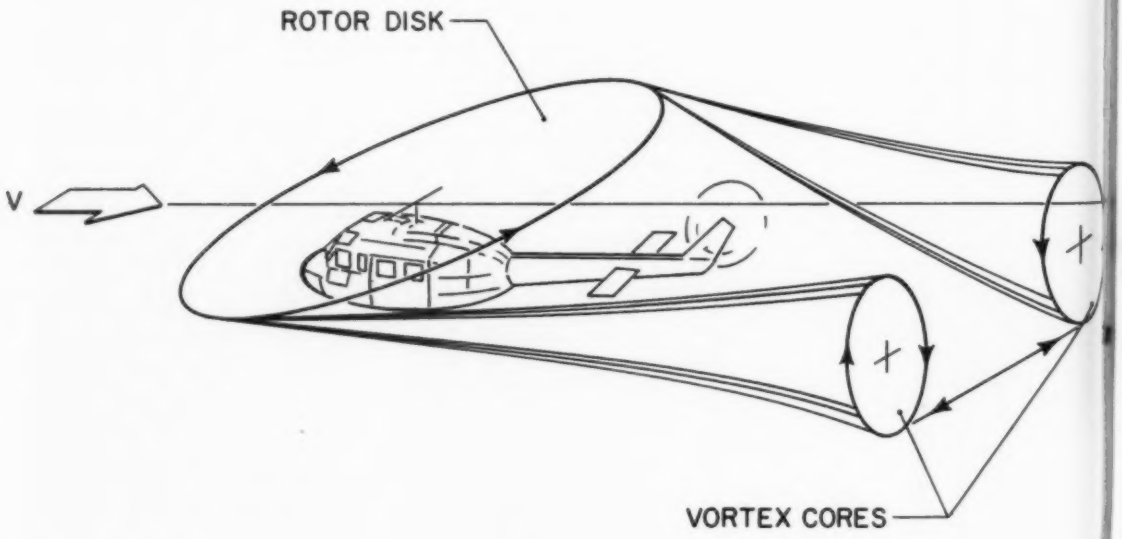
The Air Force in 1967 attributed helo rotor wash as a significant factor in two accidents. One involved a C-130 on takeoff and the other a C-7 on landing. As a result of these accidents the Air Force Flight Dynamics Laboratory conducted a study. The conclusions of that study are presented here.

Note: In view of the length of this paper, we have chosen to reprint only the conclusions and figures 2 and 3 of the AFFDL Study. (ATISD-F-E)

Conclusions

In general, helicopter wakes are similar to wakes of fixed wing aircraft, and it follows that operational problems associated with wake encounter are similar. The lower operating speeds of helicopters, however, can result in higher intensity wakes and consequently more severe wake encounters. Although it has been shown that a rotor wake vortex encounter in flight can be a real hazard, such an encounter requires that the penetrating aircraft be in a certain limited spatial region at a certain time and under suitable atmospheric conditions. Such a combination of circumstances apparently occurs infrequently despite the frequency of high density traffic in terminal areas.

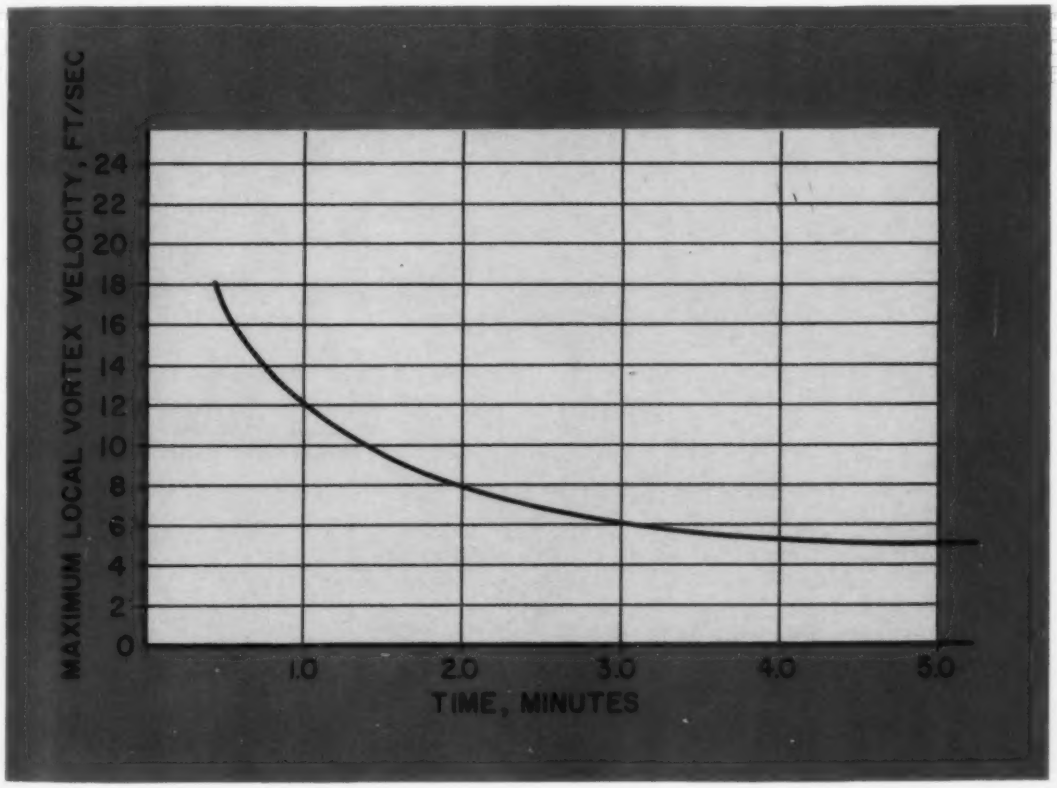
Exposure to the rotor wake vortex hazard, particularly in the sensitive takeoff and landing operations, can be substantially reduced by suitable air traffic control procedures which emphasize appropriate sequencing and spacing of flight paths.



Basically, the penetrating aircraft should be on or above the flight path of the vortex generating aircraft or have a separation time of at least 1 – 1½ minutes if below the flight path of the vortex generating aircraft. The lighter the weight of the penetrating aircraft with respect to the generating aircraft, the more serious is the hazard to be expected. However, as a caution note, the vortex intensity of the helicopter rotor wake is a direct function of disk loading. Thus, helicopters with greater disk loadings will produce wakes of greater intensity at a given speed, regardless of size, and larger helicopters with the same disk loadings produce wakes enlarged only in size. As one final note, pilots flying light observation aircraft should observe the above precautions with extra care, particularly when low and slow.

Although this report has not presented any details regarding problems associated with hovering helicopters, a brief review of the literature concerning helicopter downwash research indicates that the following precautions for this type of operation should be noted. In general, helicopters should not be hovered closer than 1000 ft upwind of an active runway or operated at high thrust under no wind conditions closer than three rotor diameters to other aircraft.

From the study it is apparent that operations officers, tower operators and helo pilots must be concerned about the effects of rotor wash around other helos and fixed wing planes. Separate helo arrival and departure routes seem advisable and helo operations anywhere near the duty runway should be closely monitored. ◄



Reference 1: Connor, Andrew B. and O'Bryan, Thomas C., "A Brief Evaluation of Helicopter Wake as a Potential Operational Hazard to Aircraft," NASA TN-D-D1227, 1962.

CLOSE CALL

THE CREW of an SH-3A, which went over the side at night after loss of control on takeoff escaped without difficulty with the exception of the copilot. His was a close call.

Just prior to water entry the copilot, in anticipation that the rotors would contact the water first, shut down both engines to prevent cartwheeling. The aircraft hit the water nose-low on the port side but with less force than he had anticipated. None of the seats were torn loose. The port side of the cockpit filled with water so rapidly that he was unable to take a breath or order abandon ship.

"I pulled the port pilot's hatch release and pushed at the window," he recalls, "but it was jammed and would not move. Then I released my seat belt and shoulder harness, which had held me firmly in my seat, in order to get a better angle to push out the hatch. I grabbed the bottom of my seat with my left hand to avoid disorientation and rammed the hatch with my shoulder and hardhat and kicked it but to no avail. I tried to open the sliding window but it was jammed in a half-open position and the opening wasn't big enough to get out of."

The copilot felt that the aircraft was sinking rapidly because of water movement in the cockpit but it was probably turning from port-side-down to inverted just below the surface of the water at this point. He decided against trying other exits because of total darkness, possible disorientation and the time-limiting lack of oxygen. He rapidly began to lose awareness and concern over his predicament.

The next thing the copilot remembers is choking on sea water followed by the complete return of his senses. Once more he pushed the window with both hands and this time it dropped out with little difficulty. His helmet cords pulled loose without incident and he easily went through the opening. He immediately inflated his life vest to surface as rapidly as possible. On the way up he caught momentarily on some part of the aircraft but was able to free himself.

On reaching the surface he found he was nearly exhausted. Inflating his life raft, he slid aboard and paddled clear of the wreckage, calling for other survivors as he went. After locating them and joining up, he turned on his strobe light and life vest flashlight.

By this time several destroyers were in the area. The copilot fired three successive pencil flares to guide an approaching destroyer, ignited the night end of a Mk-13 Mod O flare and blew his whistle. Since the survivors were all together and had sustained only minor injuries they were quickly loaded aboard the motor whaleboat.

All members of the helicopter crew expressed opinions later that previous ditching drills and complete understanding of exiting and survival procedures were the saving factors:

"Although the copilot was nearly exhausted after his recent escape," investigators stated, "his rapid and efficient use of all needed survival gear minimized the dangers of exposure and greatly aided rescue crews in pinpointing the location of the survivors." ◄

Who Conducted the Preflight?

While taxiing to the approach end of the duty runway at NAS Blank early on a cold winter morning, the pilots were discussing the events of the previous evening and preparing to take off on the homeward bound leg of a holiday leave run.

The PPC was in the right seat and a 3P in the left as the P-3 sub-hunter prepared to take the runway. Then the pilot (3P) noticed something irregular, not a big glaring light or horn but something small and hard to pinpoint; a nagging sensation of caution. As he slowed the *Orion* to hold short he knew what it was – the taxi light was flickering.

But why had the light not done this all the time? Suddenly it all became clear, – it only happened when the props were reversed for slowing the aircraft and the prop wash blew something in front of the light to shade it, thus making it appear to flicker. What could cause this?

The conclusion was obvious, the gear pin flag! The pin had not been removed. Because of the cold morning and the darkness, everyone had been anxious to get inside the plane and keep warm. No preflight had been conducted due to a little laxness on a cold morning. The whole system of checks and double-checks had collapsed.

Crusader Droop Loss

During the conduct of a routine tactics F-8B hop, the starboard outer droop separated from the aircraft. The aircraft was well within the Vn diagram and the droop separation appears to have been caused by faulty maintenance at the overhaul activity.

I have over 1100 hours in all variants of *Crusaders* and have had most of the emergencies at one time or another, but this was my first droop loss. I did my slow flight at 15,000 ft and was surprised to discover that 165 kts was the slowest speed at which I could maintain wings level. I then decided to land at an NAS and use their 11,800 ft runway. It was a real calm smooth day and the wind was only about two knots, so I decided to land at 170 kts, this was only a 5 to 7-factor. I told myself that I would religiously hold 170 kts until I had planted the rubber on the pavement. I had a wingman fly with me all the way, just in case I got slow, and had an LSO on the runway.

I set up for a long straight-in approach and held 170 until T.D. Just prior to touchdown the aircraft rolled about 20 degrees right wing down. It scared the

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Navel and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

day ghus out of me and I had a little bouncing around before I got it under control. In retrospect, I think that the ground effect must have caused the aircraft to roll prior to touchdown and 5 kts was not enough J-factor.

I have been flying *Crusaders* for the last six years, and this has never been mentioned, to my knowledge.

BEWILDERED MOUSE

Penetration Check List Mouse

Returning to Marsnal after a dusk attack against NVN, my wingman and I practiced *pinging* a KA-4. As dusk deepened we set up holding patterns; our ship uses individual altitudes. Weather was reported as 3000 scattered to broken with 8 miles visibility. Tops of the clouds were at 10,000 ft. Descending from altitude, it was quite dark and I was advised, "No precision radar available; descend to 600 ft at 6 nm."

Expecting to acquire visual reference for lineup upon reaching 600 ft I saw nothing and used radar vectors plus tacan until 1 nm. At this point only the centerline strobes were faintly visible; no joy on the lens or moonbeams (white lights). Diagnosing my problem as a dirty windscreen; I called Clara and requested a talk-down.

With no visual reference to the ship I waved off at 200 ft and was startled by the good visibility out the *side* of my canopy. Entering the bolter pattern I realized the electrically heated windshield element had failed; the forward windscreen was classically frosted over by condensation! Full hot air cleared the forward panel for my next pass.

On deck I vowed to use the penetration check list at the top of my next CCA rather than at the bottom. Troubleshooters later found a blown fuze for the NESA glass in my A-4.

Wonder if any unexplained "flew into the water on a clear night" accidents may have had a fogged-up canopy as a contributing cause?

• Yes, there are a few "undetermined" mishaps wherein a fogged-up canopy could be the prime suspect. This is good food for thought and we hope all pilots take note.

Runway Intersection Nearmiss

While landing from a GCA (estimated ceiling was 1000 ft with 3 miles visibility in haze) we had the *potential* accident just waiting to happen; it could have been a midair or ground collision.

We spotted the other aircraft just as we were about to touch down on runway 6, landing long due to construction workers. The F-4 was on short final to runway 31 in the FCLP pattern.

Timing was such that had the other aircraft pilot decided to make a final landing, we would have met at the intersection. Had we waved off, we would have met 50 ft above the intersection. As it was we continued to roll out, attempting to stop ASAP. The F-4 made a touch-and-go and passed just above us.

We knew there were aircraft in the FCLP pattern but were not advised of this particular aircraft and he apparently wasn't aware of our presence. GCA knew nothing about him as was revealed by questioning.

Cover Too!

On a particularly black night in WestPac a new 2P was told to go to the flight deck and start the No. 1 engine and unfold the blades on an SH-3A. Maintenance informed him the bird was ready to turn and that a rotor brake check would follow.

On reaching the darkened flight deck, the young pilot used a red flashlight for a quick look around the aircraft and then climbed in. Number 1 engine starter was engaged and after a check for proper Ng and T_5 readings, the speed selector was brought around the horn. There was a slow steady climb in T_5 to about 450^0. The engine was secured and the pilot wondered, "What's wrong with this hog?"

Another check revealed that the covers were still on the engines. Said covers were removed and after a short time lapse, the starter was re-engaged. Almost immediately a fire broke out in the exhaust section of No. 1 engine. Both fuel and starter were secured. CO_2 was applied to the exhaust section and, with the fuel off, the starter was re-engaged. The combination of the two put the fire out in a matter of seconds. Later investigation showed no damage to engine or aircraft.

The new pilot learned the obvious, that a preflight is necessary even if the bird is not going to fly. In addition, it might be pointed out that securing the ignitors and the fuel while leaving the starter engaged would have secured the fire even sooner. All in all, an inexpensive lesson in *Do's* for particularly one new 2P. ◄

FORUM:

Mk 13 Mod O Flare

As a survival instructor for the Naval Air Reserve Training Unit, NAS Alameda, I have had several opportunities to demonstrate the Mk 13 Mod O day/night distress signal. From past experience at the SERE school in Brunswick, we have found that the day end can be used to signal at night by using a cigarette lighter to ignite the smoke that emits from it. Once lit, the flame will be about 3 ft long and 1 ft wide at the widest point and extremely bright. However, the pressure of the escaping smoke will eventually blow the flame up and out to the end of the dense smoke. By keeping the lighter ready, it can be re-ignited. Sometimes it will burn all the way out by itself. In trying to use the matches in survival kits, I have found that the pressure will blow them out as ignition takes place so it is advisable to have extras handy.

I believe this is information that's nice to know if ever you find yourself down at night after using up all of the night ends of your distress signals.

AMS1 J. A. ORTNER
NARTU, NAS Alameda

▲ Your suggestion is an excellent one and something that everyone who carries the Mk 13 Mod O distress signal should know. APPROACH requested the Naval Ammunition Depot at Crane, Indiana to conduct some tests with the MK 13 Mod O distress signal using your suggested method of igniting the day smoke end. NAD Crane found that any open flame would do for an ignition source and that there was no sudden combustion associated with ignition. We must consider the fact that all naval aviators and air crewmen are potential survivors and suggest that squadron ASOs and survival officers conduct some training in the use of this signal method. A little practice could pay big dividends when the chips are down. We also suggest the wearing of gloves for protection of the hands anytime you ignite your distress signal.

Shower Room Decks

Not only is safety important in aviation and aviation equipment but the safety of the personnel who maintain this equipment is also important. The main hazard I have found common to every base I've been stationed at thus far – Cecil Field, NAS Jacksonville, NAS Quonset and even the Great Lakes Training Center – is the slippery decks in the head just outside the showers. These decks are made of tile or terrazzo and are constantly wet. A fall on such a deck can cause serious injury.

Placing a few inexpensive adhesive rubber strips on these decks would make the barracks a safer place. As you know, and statistics will back me up, more accidents happen in the home than any place else. Since this is *our* home while we are in the service let's make it a safer place to live in!

AN R. B. ROLFE
VS-32
Quonset Point, R. I.

Don't be afraid to ask stupid questions, they're a helluva lot easier to explain than stupid mistakes!

Do you have a question regarding material or procedures now in use in Naval Aviation? For an answer send it to FORUM, Naval Safety Center, NAS Norfolk, Va. 23511.

▲ Our appreciation for bringing this hazard to our attention. We trust station, ship and squadron safety officers will encourage procurement and application of some nonslip material at the local level.

Chukka Style Safety Shoes

I understand there's a new directive out on the chukka style safety shoe for flight deck crew personnel. Is this correct?

SHOELESS JOE

▲ The directive is Navy Clothing and Textile Research Unit Field Notice 4410 of 15 May 68, Shoe, Safety, Chukka Style, Mil-S-21894, Class 2, FSN 9D 8430-928-6386 series; introduction of. This shoe is identical to the standard water resistant, traction ribbed sole fleet shoe except for the addition of a steel safety toe. It is to be used in all areas including shore based activities where occupational hazards dictate the requirement for safety footwear and is *not* restricted to flight deck operations only.

File for Reference and Study

The articles "Big Switch from Air to Nitrogen" and "Mil-C-23411 for CP" in the May issue were outstanding.

Would it be possible to have this type of material made up onto perforated pages which could then be easily removed for retention? I remove such articles from the magazine for file reference and study material.

You have probably answered this question for many people but I have not seen it published.

AMHC V. W. GANDERTON
Sanford, Fla.

▲ We've never addressed the question as stated but we've often had the idea in mind. Our printing contract, as released by the Government Printing Office, does not have provisions for such practice in the interest of economy. The alternative is to save each issue of each volume of issues – July through June – and refer to the index in each issue for articles of reference. Each July a cumulative index covering articles in the entire volume is published which serves as a handy locator. Otherwise, a pair of scissors will do for a condensed file.

Unlike the flight control systems on present day high performance aircraft – the Naval Safety Center desires a continued feedback.

Has information in any Safety Center publication ever helped you to prevent an accident, avert an injury, or deal with an emergency in a better way?

If so, and you have not already informed the Safety Center, it is particularly desired and important that you do so. Such feedback is vital to all departments at the Center and for fiscal support of our safety research and education program.

Helo Hoist Technique

Jumpin' Jehosophat and 10 lashes with a soggy swizzle stick. To lead off an otherwise outstanding article about helo rescue apparatus ("Rescue Reminders," July issue) with a glaring example of how not to be hoisted. What would Grandpa Pettibone say?

As pointed out on page 28 when being hoisted in the sling, clasp your hands together. As the warning on page 30 states, "keep your hands away from the hoist cable swivel."

LCDR R. L. BURNS, USCG
Flight Safety Officer
CG Air Station, Astoria

▲ Gramps would probably say the editors would have been smarter to head off such correspondence by including an editor's note to the effect that the Navy's hoist position is still that shown in the photograph. Aviation Clothing and Survival Equipment Bulletin 30-59, a condensed version of which appeared on pages 30-31 of the December 1967 APPROACH, refers. We checked the photo out with the Safety Center's survival equipment people before publication to see if they thought the survivor shown was endangering his hands and the answer was negative.

Your humorous letter was a bright spot in the daily mail. We agree with you that this Coast Guard-authored article was outstanding. ◄

PASS IT ALONG!

Each copy of APPROACH is meant for ten readers.

Points

Exceptionally well qualified.

Quick thinking.

Approaches difficult problems with zest.

Often spends extra hours on the job.

Demonstrates qualities of leadership.

Keen sense of humor.

Active socially.

Takes advantage of every opportunity to progress.

Exceptional flying ability.

A very fine officer of great value to the service.

s of View

Has committed no major blunders to date.

Offers plausible excuses for errors.

Finds someone else to do the job.

Has miserable home life.

Has a loud voice.

Has vast repertoire of dirty jokes.

Drinks heavily.

Buys drinks for the XO and CO.

Has equal number of takeoffs and landings.

Usually gets his work done on time.

Australian RAF Air Clues

Going flying this afternoon?

So What's for L

Would you believe beans, frankfurters and sauerkraut and later, just before takeoff, two cokes? You better believe it! And although the events in the true story we are about to consider came within a hair's breadth of costing a student pilot his life as well as subtracting one TF-9J from the inventory, he came out of it with nothing more than a hairy story for happy hour – if he cares to tell it.

Our student, well-stuffed with beans and the other above-mentioned goodies, was No. 4 man in a five-plane formation flight. About the time the flight passed through 15,000 ft on climbout, he began to have (you guessed it) abdominal cramps. As altitude increased, his cramps worsened. When the flight approached FL 260, the student finally reported his troubles to the flight leader. The leader advised him to check his oxygen and cabin pressurization systems. He did so; oxygen was 100% and blinking but the cabin pressurization gage read 24,000 ft.

By this time the flight had reached FL 310. The student pilot, now in extreme pain, lost consciousness. The last thing he remembers is reducing power and deploying speed brakes. The aircraft departed the formation, entered a steep dive and disappeared into a solid overcast at 10,000 ft.

During this time, the other pilots in the formation made numerous transmissions directing the student to eject. These, of course, went unheard as the TF-9J continued to descend.

Some time later, the student regained consciousness. He found he was at 10,000 ft with the aircraft wings level, nose slightly high, airspeed 220 kts and speed brakes deployed. He again contacted the flight leader.

Lunch?

Because of marginal weather at all enroute fields, the flight leader elected to have him continue at 15,000 ft to destination. Following an uneventful landing, the student pilot reported to sick bay for examination.

Hypoxia Ruled Out

Medical personnel ruled out hypoxia as a cause of the student's difficulties because of 1) the lack of classic symptoms and 2) the fact that the oxygen system appeared to have been operating normally. The system including mask had checked normal on preflight, inflight and postflight tests.

The most probable cause of the student's incapacitation was thought to have been vasovagal syncope – unconsciousness resulting from a reflex slowing of the heart because of gaseous distention of the bowel. *(Severe pain was probably a factor here also. – Ed.)*

The student pilot might have gotten by with simple indigestion and transient gas pains except for one important additional fact. The aircraft pressurization system had failed because of a line which disconnected when the associated fitting apparently vibrated loose.

The squadron C. O. was of the opinion that the student pilot showed poor judgment in not reporting his problems earlier in the flight. Corrective action taken at a lower altitude might have avoided incapacitation, he said.

Gases Expand at Altitude

Though our pilot might have eaten well, he did not eat wisely. It's a pretty well-known fact that gases in the human body expand as altitude increases. This phenomenon is the basis of the syndrome called "dysbarism," a term which includes all the physiological effects of reduced barometric pressure on the human body independent of the effects of hypoxia. (See "Dysbarism," March 1968 APPROACH, p. 30.)

Dysbarism symptoms fall into two general categories: 1) effects of evolved gases, resulting in the bends, chokes and creeps and 2) effects of expansion of trapped gases which can result in abdominal pain, such as that experienced by our student pilot, and aerodontalgia or altitude-induced toothache. (An article on aerodontalgia will appear in a forthcoming APPROACH.) Pain in the sinuses at altitude is usually not the result of expanding gas but is, instead, a compression phenomenon.

Most Common Symptom

Abdominal pain is the most common symptom caused by the expansion of trapped gas. Such pain can begin early in the flight, and, if not relieved by belching or passing of the gas, can progress from a simple feeling of distention to severe cramps. Relief of symptoms becomes more difficult to achieve at increased altitude.

You probably remember the balloon in the physiology training unit pressure chamber run; as chamber altitude increased, the balloon grew larger. To illustrate the expansion of gas as altitude increases, for instance, an initial volume of one liter of wet gas becomes 1.5 liters at 10,000 ft, three liters at 25,000 ft and 7.6 liters at 40,000 ft. At 50,000 ft the original liter becomes 17 liters.[1]

Individual sensitivity or irritability of the digestive

[1]USAF Manual 160-30, July 1953, p. 37.

tract varies from time to time in an individual, depending on such factors as fatigue, emotional tone, dietary habits and general physical condition. In certain individuals, certain foods seem to alter the sensitivity of the intestinal tract to gaseous distention and cause gastrointestinal symptoms.

In its most severe form, abdominal pain from the expansion of trapped gas can, as in the case of the student pilot, lead to circulatory reaction and unconsciousness.

Gaseous Mixture

The digestive tract normally contains varying amounts of gas with the stomach and large intestine containing considerably more than the small intestine. This gaseous mixture comprises oxygen, carbon dioxide, nitrogen, hydrogen, methane and hydrogen sulfide. The greatest percentage is nitrogen.

Principle sources of this gas are swallowed atmospheric air and gas formed as the result of digestive processes. Swallowed air is believed to account for a large proportion of the gas in the stomach and intestine. We swallow air while chewing gum,drinking water from fountains, gulping our meals, inhaling cigarette smoke or pulling on a pipe and drinking carbonated beverages or frothy drinks such as milk shakes.

McFarland[2] lists the most common gas-forming foods as:

- Such vegetables as beans, cabbage, onions, cucumbers, corn, cauliflower and peppers
- Such fruits as melons and raw apples
- Eggs, especially fried or hard boiled
- Long-fibered or tough meats and pork products
- Doughy breads, bran and dry cereals with a cellulose content.
- Spices in excess
- Alcohol
- Drugs such as sodium bicarbonate and other effervescent powders

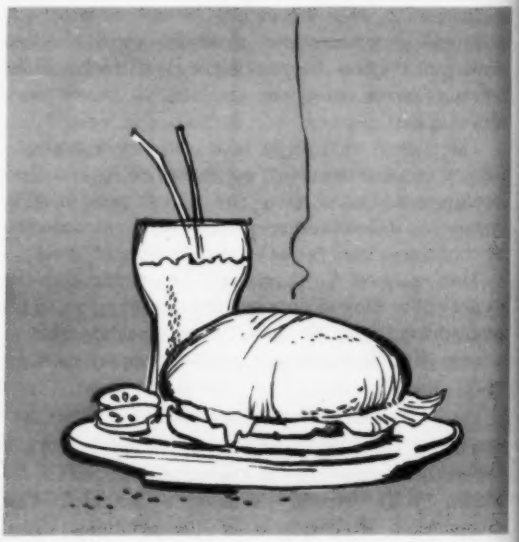
It is impossible to predict, however, which of these will form the most gas in an individual. Each person has to learn by his own experience what to avoid.

Experiment Described

McFarland describes an experiment on the effect of diet on the gastrointestional symptoms of military pilots at high altitude. The experimental situation was a simulated ascent to FL 380 in a pressure chamber. A few hours before the chamber run, one group was fed a gastrointestinal-irritating meal of a carbonated beverage, two fried pork chops, one fresh roll with one pat of butter, prepared navy beans, a raw apple, cole slaw with vinegar, salt and pepper, and a lettuce leaf. The second group of pilots got a bland meal of roast beef without gravy, mashed potatoes, pureed carrots, stewed pear, baked custard, a slice of buttered white toast and a glass of milk. Discomfort at high altitude was reported by only 11 percent of the men who ate the bland meal compared to 75 percent of the men who ate the irritating meal.

Eating irregularly and in haste makes some individuals more susceptible to gas pains. As far back as World War II, Army Air Corps flight surgeons observed that at bases where the schedule was very strenuous and irregular and pilots had to eat hastily and at irregular intervals, the number of men who could not tolerate high altitude in pressure chamber runs because of gas pains was as much as 10 times that in groups living normally. Gas pains are said to have presented a more serious problem here than the bends.

Fortunately, cases in which a pilot or aircrewman passes out from the effects of intestinal gas at altitude are rare. Inflight digestive disturbances, however, are common. If you are going flying today, choose your food wisely and avoid unnecessary discomfort. ◄



[2]McFarland, *Human Factors in Air Transportation,* 1953, p. 285.

RESCUE REPORT

SHORTLY after takeoff on a test flight, as an RA-3B climbed out paralleling the coast, the pilot found that left rudder trim was unobtainable. Within seconds, the PT (photo technician) called out, "Smoke in the photo compartment." Since this account is primarily concerned with the escape and rescue experiences of the three-man crew, we will not detail the pilot's actions to cope with the rapidly deteriorating situation. The primary cause of the accident was determined to be material failure of the bleed-air ducting system plus starboard engine malfunction and fire.

We pick up events as the pilot, seeing they were approaching mountainous terrain, decided that there would be insufficient altitude for a safe bailout. He added power to the port engine whereupon the aircraft immediately went into a steep diving turn to the right. Pulling power off the port engine, he fought to control the aircraft. He had already told the crew to bail out and

had pulled the escape chute handle but with negative results (due to a rigging failure/malfunction of the primary cable assembly). At this point the ICS had failed and he had shouted to the PT to blow the door manually. While the PN (photo navigator) continued to try the primary escape chute handle, the PT had jumped down on the door and pulled the emergency foot treadle up but had not actuated it.

After successfully leveling the aircraft, the pilot again told the crew to bail out. The PT actuated the emergency treadle and left the aircraft with the PN close behind him. Discovering the port engine had flamed out and unsuccessfully attempting a relight, the pilot broadcast a Mayday, pulled his seat release D-ring and dove through the escape chute door head first.

Now let us follow the individual crewmen until their rescue.

Photo-technician: Having jumped down on the escape chute door and pulled the handle up, the PT turned around for a signal to go and heard the pilot yell the order to bail out.

"I turned, jumped on the treadle and went out," he recalls. "I don't know what altitude we were at but I experienced some severe buffeting. I started pulling the ripcord as soon as I was clear of the aircraft."

During descent he saw the aircraft trailing smoke from the starboard engine and the parachutes of the PN and the pilot. He disconnected his left rocket jet fitting and prepared to hit the water. Because there was little or no wind, the parachute canopy came down directly on top of him.

"I inflated my life vest and disconnected the parachute fittings. At this time I found that my legs were completely entangled with shroudlines. I reached for my shroud cutter and found it was gone. I then reached for my survival knife but I couldn't get it out because lines were criss-crossed over my chest. I tried to stay clear of the chute and untangle myself but it was impossible. About this time a helo came towards me and lowered the rescue seat. I tried to swim for it but had to pull the chute along with me. As the helo came close the rotor wash started blowing the chute under. Fortunately, the helo backed off and a crewman was dropped to help me."

The crewman was in fact, the copilot of the helo which was airborne on a test hop.

"Since we had only one crewman aboard," the helo copilot explained in the Rescue Report, "I climbed out of my seat and went down to assist the man in the water. I took the pneumatic cutter down with me but was unable to get it charged. When I reached him I asked if he had released his fittings and he replied yes. He advised me that his legs were tangled in the shroud lines and that he had lost his shroud cutter. I could feel the lines down around my feet. He raised the leg that was tangled and I pulled off his shoe and pulled the bunch of lines around his leg down over his foot and off. Then I asked him if he was free and he said yes. We both then swam over to the rescue seat about 10 ft from us and he got on and started up.

"When he broke water I could see some shroud lines still on him around his waist under his mae west. I tried to free him but as I did he was raised out of the water and dragged away from me."

The weight of the water-filled canopy made the hoist cable slip. As the helo lowered the man back down, the parachute billowed. The helo pilot describes the dilemma:

"By this time we were quite a distance from my copilot so we attempted to get the man to let go of the hook with the intention of bringing the copilot back over to assist him in removing the parachute. This became impossible for, by this time, the man had become so entangled in his shroud lines that he was tied to the seat and couldn't release himself. Cutting the cable was considered but rejected.

"It was impossible to pick the survivor up because of the weight or release him because of his entanglement, so I decided to go down and haul him in by hand. The man, by this time, appeared to be weakening. Also, a considerable amount of water was being blown about by the rotor wash. I hovered the aircraft close enough to the water to permit the crewman to reach out and haul the man in and cut the shroud lines. The parachute canopy at this time was underwater and fell away. The man was visibly shaken but unharmed. We then picked up our copilot who assisted in picking up the other two survivors."

Photo-Navigator: The PN exited the aircraft feet first in the prescribed manner and began to tumble. The parachute opened with a noticeable jerk and he was burned on the left side of his neck by shroud lines. He discovered that his helmet was dislodged.

"I removed my helmet and dropped it into the sea below," he recalls. "Then I looked up at my parachute canopy and it was a mess. I had what is referred to as a 'mae west' – two canopies instead of one, divided by overlying shroud lines. I reached up and tried to untangle them by jerking on the risers but to no avail. I decided not to cut my shroud lines for fear of making a streamer."

He had his hands on the toggles of his Mk-3C and pulled them just as he went in the water. He immediately released his parachute fittings.

"Since the water was calm," he says, "I also released the seat pan and life raft. Dye marker had already begun

to appear. I next swam over and recovered my helmet. By this time the helo had arrived over the PT and was having some difficulty in recovering him. I left my helmet and boots behind and started swimming toward him but he was finally recovered and the helicopter headed my way."

The PN was hoisted without difficulty. He concludes his statement, "I cannot say enough about the outstanding airmanship demonstrated by (the RA-3B pilot). Although undoubtedly unnerved by the entire sequence of events, he seemed to know exactly what to do and when to do it. I hold no reservations when I say that he saved the lives of his crew."

Pilot: After broadcasting a Mayday report, the pilot pulled his seat release and made his way aft.

"Nothing got hung up or slowed me down. I dived head-first through the escape chute as the aircraft was in a nose-down attitude and I could make faster progress this way. There was tremendous turbulence and buffeting as I cleared the aircraft. I turned to reach for my D-ring but decided against it until the turbulence stopped. I also had checked the crew's lanyards which were all connected so I felt confident that the chute would pop pretty quick which it did. I think I was still head-down when the chute popped. The airplane hit the water with a loud boom. I turned in the chute and saw the white foam where it went in.

"The chute opening didn't seem too hard. I knew I wasn't too high so I released my left leg fitting and swung my seat pack around to the right. I tied the life raft lanyard hook to my Mk-3C, then pulled the raft and swung it down on the end of the lanyard. Shortly thereafter I saw the water coming up to me and had just enough time to inflate the right side of my life preserver. I hit the water almost immediately, bobbed right back up to the surface, released the parachute fittings and pulled the other toggle on my life preserver. Then I pulled the raft over to me, inflated it and got in."

The pilot's helmet had come off in the bailout. Although his chin strap had been pulled tight, he had not felt the helmet go. He had also lost his shroud cutter.

"I looked around and saw the helicopter picking up one of my crewmen so I knew they'd be over shortly. Since I had the time, I pulled out my pencil flare gun, loaded it and fired off two rounds. The first didn't work but the second one was OK. The A-4 flying overhead dipped his wings to let me know he saw me. Next I tried the day-smoke end of a Mk 13 Mod O signal flare; it didn't work. I then pulled out my survival knife in case I had to cut shroud lines as the chute was drifting with me and was now directly underneath the raft.

"Pulling the survival kit out of the chute seat, I opened it up. Everything was connected by nylon lanyards and looked in good shape. I tried the radio in the seat pack but it didn't work – I couldn't depress the transmit button. However, when I checked the switch on top, it appeared to be all the way up.

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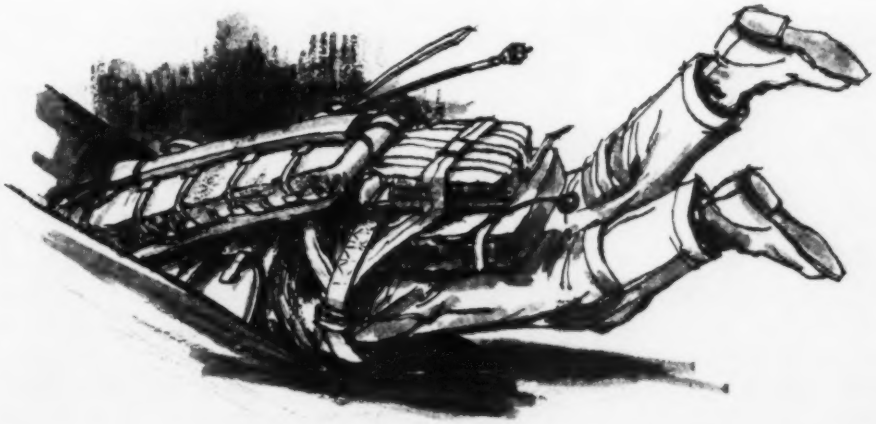


"At this time I looked back to see how the helo was coming. I saw a smoke flare and also that the helo had moved to a new position so I knew they had both of my crew. I waited until they called for me to get out of the raft. Although the chute was still hanging around, it didn't hinder me. The spray whipped up by the copter was very strong but I swam through it to the rescue seat and climbed on. The hoist aboard was no problem; I just hung on until I was inside the helo. The trip home was pretty routine."

Here are the investigators' comments on personal survival equipment in this accident:

PRC-49: The pilot stated that he was unable to move the mode selector switch (beep or voice transmit) to the transmit position. He also stated that the ball was missing from its normal position. In accordance with the latest directive at the time of the accident, squadron aircrewmen carried two survival radios, one on their personal survival vest (RT-10) and one in the parachute survival kit (PRC-49B).

(As of this writing, some 1500 PRC-49Bs still in the system are slated to be purged by the end of CY 1968. – Ed.)

Investigators were of the opinion that the PRC-49B failure was caused by the ball retaining spring being jammed in a full down position which in fact caused loss of the ball and resulted in inability to transmit in any mode. There were no other survival radio failures noted.

Mk 13 Mod O Distress Signal: The pilot attempted to ignite the day end of one Mk 13 flare but was unsuccessful. Inasmuch as these flares are susceptible to failure through improper operation, the pilot was given several flares and asked to demonstrate the proper technique. He used proper technique with successful flare ignition in all instances. Investigation of flares in survival equipment revealed that many of the flares had been declared unserviceable by a Ships Parts Control Center Notice some months prior to the accident. Mk 13 flares are stocked and packed in their appropriate places/equipment by NAS "X" for tenant activities as an intermediate level maintenance function. Immediate action was taken to replace all unserviceable flares.

MC-1 Survival Knife: The pilot and PT both reported loss of their shroud cutters. These knives are encased in a sturdy nylon sheath on the survival vest and are further secured by a nylon loop through the knife ring which is buttoned to the vest. In addition, the knife is further secured to the vest by a long nylon lanyard to preclude its loss if dropped in the water. Cause of the loss was not determined.

Mk 79 Pencil Flares: The pilot stated that he fired two of the subject flares of which one failed to ignite after firing. Investigators examined all Mk 79 pencil flares and test-fired several from each crewmember's personal kit. All flares were current and operated satisfactorily. Investigators concluded that the flare failure was probably due to a material malfunction.

APH-6 Helmet: The pilot lost his helmet upon exiting the aircraft. This can be attributed to entering the slipstream head-first (an action akin to holding a bucket open-ended in the water alongside a swiftly moving boat). This helmet was a standard Navy issue APH-6 with all modifications installed. The PN who exited the aircraft in the prescribed fashion did not lose his helmet even though the parachute risers during deployment passed across the back of his neck and under the helmet, raising it partially off his head.

Parachute (MB-7, 28 ft canopy): The cause of the line over or mae west effect experienced by the PN is unknown and the squadron requested information on this subject from Naval Aerospace Recovery Facility, El Centro.

NARF El Centro replied to the squadron's questions as follows:

- What conditions can result in a line-over type opening?

  "1. Body position and action when container opens.

  "2. Loose suspension lines allowing canopy cloth to get tucked under lines before or during deployment"

- Which of these conditions were the most probable contributors to this particular incident?

  "One: RA-3B exit tends to cause tumbling. Suspension line would overrun canopy momentarily restrained by contacting jumper."

- What is the relative frequency of such occurrences?

  "Frequency approximately 1 percent."

- What corrective measures does NARF recommend?

  "Attempt to stabilize body by spreading arms and legs, arching back, when line-over occurs pull lines on small lobe."

Hindsight by itself is worthless but its influence on foresight is invaluable.

AN/PRC-90 Survival Radio

A personal survival radio in the hands of a survivor who is completely checked out on its operation can be the most important single factor in a successful rescue. The following information on the new AN/PRC-90 was furnished by LCDR Frank Quigley of the Naval Air Systems Command whose article "Status Report" on survival radios and beacons appeared in the June issue.

The AN/PRC-90 is a 1.4 lb personal survival radio which provides an emergency beacon, voice or MCW communication on 243.0 MHz, and voice communication on 282.8 MHz. This survival radio has two completely separate transmitters and receivers, one for each channel. If one transmitter should be disabled, the downed airman has a backup transmitter-receiver on the other channel. The MCW, when used with the earphone, provides for covert operation.

Vol: The volume control controls the volume to the speaker or earphone in the receive position.

Function Knob: The function knob turns the radio on and chooses the desired mode of operation and channel. The indicator arrow points to the mode selected.

Operation: To operate the emergency beacon on 243.0 MHz, simply rotate the function knob to that position. The transmitter sidetone will be heard in the speaker. In all units after the first 1800 units manufactured, the volume control will have no effect on the volume of the sidetone monitor.

To operate MCW on 243.0 MHz, rotate the function knob to the Voice/MCW 243.0 position and key the button on the top of the radio. The sidetone will be heard in the speaker. The International Morse Code is printed on the back of the radio set. Voice operation can also be accomplished with the function

knob in this position by depressing the push-to-talk button on the side of the set.

To operate voice or 282.8 MHz, depress the indicator arrow and rotate the function knob to the Voice 282.8 position, then operate as in the Voice 243.0 mode. In both voice modes the speaker will have no output while the push-to-talk button is depressed. To return to any other mode simply rotate the function knob.

The antenna should be released from the retaining clip and held in a vertical position during operation. It is flexible but more rigid than the PRC-63; it is also easily replaceable. *Hint:* When a rescue aircraft is sighted, position the antenna so that its length is perpendicular to the line of sight to the aircraft.

The unit is completely waterproof and can withstand submersion to a depth of 50 ft plus. It has survived at a depth of 200 ft. Each unit is provided with an earphone that disables the speaker for covert operation. The earphone is connected to the jack next to the antenna.

Operation instructions are printed on the back of the radio set.

The unit can be operated with one hand and the function switch and volume control are provided with non-slip knobs for easy operation with wet gloves.

The AN/PRC-90 is also provided with a separate speaker and microphone for added reliability.

Distribution: Deliveries of 4800 units consigned to ComFairWestPac began in April with distribution of the follow-on procurement to ConUS-controlled activities. The present procurement includes special support equipment to be delivered concurrent with deliveries of the unit itself. Publications and spare parts have been procured and delivery will follow. Replenishment of survival radios in the foreseeable future will be by continued procurement of the AN/PRC-90.

INADEQUATE SLEEP

REPORTING on an accident in which a student pilot in a T-2B pressed a gunnery run too close and collided with the tow banner, the investigating flight surgeon commented on the student's lack of sleep.

"An important element is that the student pilot had only four hours' sleep following a busy weekend prior to his scheduled flight. This could have contributed to an increase in reaction time, especially so in a gunnery pattern where constant G forces are prevalent.

"Adequate sleep is such a variable among personnel and also varies widely with age; thus strict rules are difficult to set forth. However, flying personnel should have approximately 8 hours in every 24 hour period."

BASKET STRIKE

A ROUTINE air-to-air gunnery mission launched from a CVA at 1430. Weather was 3000 ft scattered, 5000 ft overcast with tops to 13,000 ft and visibility unlimited. After 1.2 hours of uneventful flight, refueling was undertaken. At FL 200, our pilot No. 3 in a three-plane formation, maneuvered his F-8E's probe toward the drogue basket. When probe and basket were aligned, he continued to close slowly, fixing his eyes on the A-4 tanker ahead. The next thing he knew his canopy shattered and, as he recalled later, "My head felt funny."

One of the other pilots in the formation who saw what had happened stated that the A-4's drogue basket struck the F-8E canopy in the 5 o'clock position and swung up and then down again on the canopy top, shattering it completely. At the time of contact, the F-8E's cabin pressurization was 8000 ft. The pilot's helmet visor was down as prescribed by NATOPS for refueling.

After the F-8E pilot broke off and down, he requested a steer to Barber's Point. Approximately 15 minutes after contact he had descended to 15,000 ft. He maintained this altitude for some 5 minutes, then 30 miles and 5 minutes from Barber's Point, began a gradual letdown. He landed without difficulty.

On medical examination, there were no signs of dysbarism or problems associated with explosive decompression except for a mild inflammation of his left ear. This cleared up rapidly.

Examination of the pilot's helmet, an APH-6A with dual visor attachment, showed that the drogue basket had struck the visor frame over the left side of his forehead. The visor had numerous scratches but was intact.

"The event described involves negligible aircraft damage and thanks in particular to hard hat and visor, no pilot injury," the investigating flight surgeon reported. "The possibility of a similar event during night operations would seem to speak well for the value of the dual visor attachment which permits ready availability of both clear and tinted visor."

GLARE

THE ONLY difficulty encountered by a SAR helo crew in retrieving an A-7 pilot was caused by their low altitude and sun glare from the water. The crew actually observed the crash and saw the flight leader circling the downed pilot as they proceeded for pickup. (The helo pilot elected to stay at

his low altitude rather than climb so as to convert all power output to a higher forward speed while enroute from his plane guard angel position to the pickup location.) The flight leader, while orbiting, was able to direct the helo adequately. However, the helo pilot reported he could have spotted the downed pilot earlier if a Mk 13 Mod O distress signal had been used by the pilot in his raft.

Investigators recommended in their final report that "during daytime helicopter rescues smoke be used as a signaling device to pinpoint location and give wind information. If smoke is not available or accessible, the downed pilot should display some signal and should not assume he has been sighted just because he has the helo in sight."

Combat conditions, investigators stated, could modify the above.

LOSES HELMET

AN A-4 pilot who ejected due to engine failure during takeoff lost his helmet. On landing, he struck his head on some rocks and sustained a mild concussion. He believes that slack in his O_2 hose was wrapped around the canopy handle prior to ejection. He had neglected to tighten his chin strap and the combined forces of wind blast and tension from the stretched oxygen hose pulled his hardhat off.

While praising the pilot's quick thinking and fast reflexes which were responsible for his successful ejection, the investigating flight surgeon recommended 1) that pilots tighten the chin straps on their hardhats and not depend solely on their oxygen masks to keep their helmets on, and 2) that pilots make sure their O_2 hoses are not caught or looped over any part of the console so that in the event of emergency egress the hose won't snag and pull the helmet off.

TRADEOFF

WHEN AN SH-3A went over the side at night on takeoff, the crew escaped successfully. The pilot, however, had to give up his PR-2 life raft to exit through the fully-opened sliding window on the starboard side. He did not use the emergency window release because he felt the aircraft was sinking rapidly and chose to move immediately out the open window. Investigators were of the opinion that saving the few seconds required to use the emergency release does not justify attempting egress through an open sliding window. Chances are great that some part of the survival gear will get caught on the window, as in this instance, adding significantly to escape time.

LIFE SUPPORT EQUIPMENT

LIFE VESTS hanging in the VS line shack for crewmembers' use are sometimes found in unsatisfactory condition, a safety council reports. Flashlights are inoperative, CO_2 bottles are missing and other items are gone. The squadron aircraft maintenance officer reported to the council that all vests are inspected at required intervals and that surprise spot checks are also made.

The council recommended that all pilots and crewmembers be cautioned again on the necessity for careful preflight of life vests and preservers. Defective flotation gear should be turned in immediately to the paraloft. It is the individual pilot and crewmember's responsibility to thoroughly inspect each life vest or preserver he uses as if his life depended on it because, in reality, *it does.*

SLURRPP-PFT!

"Chopper jet engine life and mission capability depend on corrosion control" – APPROACH May 1963

THAT same statement is just as applicable today as it was five years ago. For pilots of the SH-3 and UH-2 this could easily be the difference between flying back or swimming back to home base.

The article "Wash or Pit" in the May 1963 APPROACH was an excellent treatise on the subject and should be as familiar as NATOPS to pilots who operate the T58 engine.

Caution – Under the right conditions it is possible to lose two T58 turbines in 20 minutes or less in a heavy salt environment.

Extensive testing – 1963 to 1965 – in the Key West area provided much salt water/salt encrustation data. These tests were conducted under controlled conditions but results were easily forecast. The procedure was not to operate over an hour without shutting down and washing out the engines. Also before each flight a topping check was conducted. An additional precaution was to hover above 30 ft then rapidly descend or climb through the lower altitude when landing or taking off from the water. During the test program continuous hovers above and below 30 ft were conducted for one purpose only – to determine the amount of salt encrustation encountered under varying condtions. (Kaman Corp. has recommended a hover between 20 ft – 30 ft for the H-2 as the best for power required, stability and ability to keep the survivor in sight for actual rescues. A high hover – above 30 ft – out of ground effect and over open water with no reference is at best very difficult.)

Moisture and salt-laden particles are always present in the air near a large body of salt water. It is not a question then of when an engine ingests salt water but how much.

Once the water droplets are formed and made a part of the rotor flow system the path traveled depends on aircraft speed, wind velocity, sea state, and aircraft altitude above water level. Figure 1 shows various attitudes and water flow paths as affected by wind velocity. In figure 1A representing 2-8 kts, the rotor is tilted forward slightly to hover in a fixed position. In this condition there is a clear tendency for the air to sweep the surface and curve upward to the rotor inlet. The water droplets form a pattern similar to a doughnut with the helo in the center of the hole. This is the situation in which the maximum number of droplets are carried into the rotor airflow pattern. Engine operation verifies extensive salt water ingestion under this conditon since the heaviest salt deposits and maximum performance deterioration are noted with 8-12 kts wind and at an aircraft altitude under 30 ft. In figure 1C the helo attitude is shown in a 20 kt wind. Here the rotor plane attitude and wind cross-flow distortion blow the salt water droplet pattern aft resulting in relatively little salt water ingestion.

"Observations were made to determine the quantity of salt water ingested into the engine under the different sea states and at various altitudes. It was shown that above 30 ft the rate of ingestion was essentially the natural salt content of the air and was crystalline rather

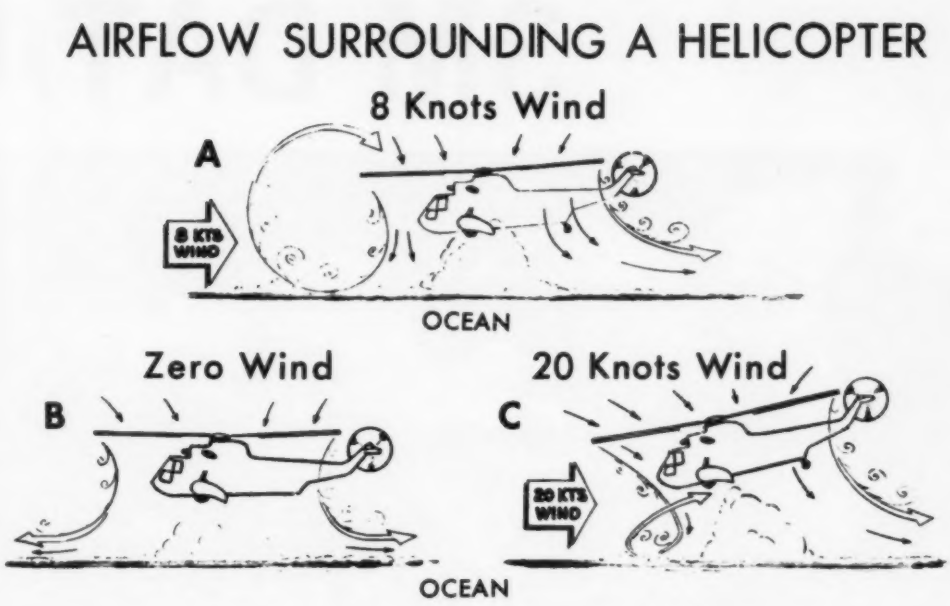


Fig 1 Attitudes and water flow paths as affected by wind velocity.

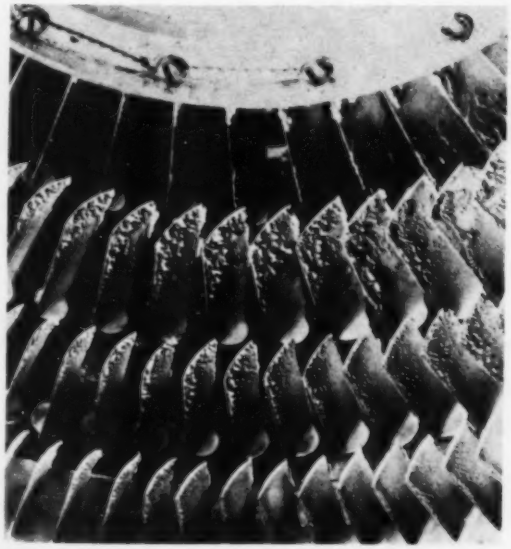


Fig 2 Salt deposits cause irregular airfoil surface.

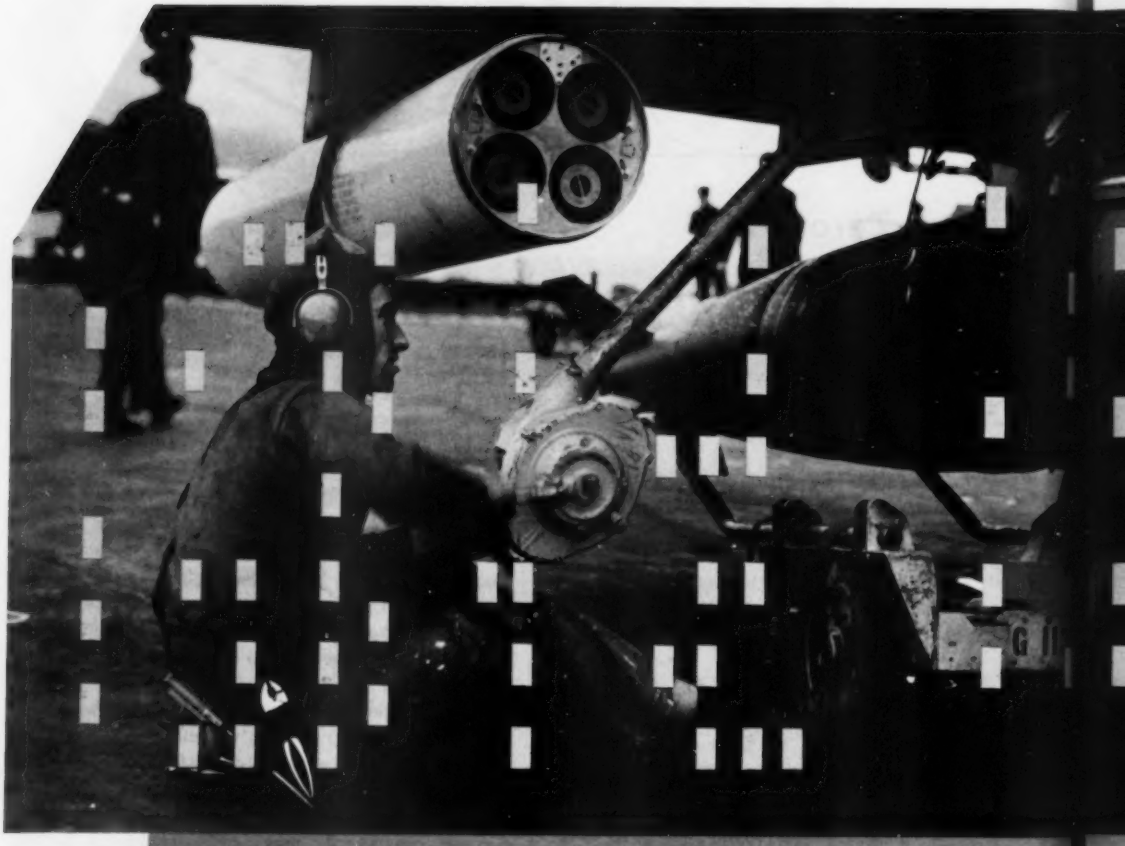
than droplet form. Below 30 ft the rate of ingestion increases in proportion to the decrease in altitude. At 30 ft about 3 cubic centimeters of salt water per minute are ingested. At 20 ft the rate is 3 to 8 cubic centimeters per minute.

As is seen in figure 2 the droplets strike the blades, dry and encrust. Engine performance deteriorates and eventually stops. Wash and Rust-Lick can easily prevent this condition.

What are some indications of salt encrustation? First, you will observe salt spray on the windshield. Second, you may experience some minor compressor stalls. Third, the T_5 may rise 30^0 to 40^0. (At this point further operation in the salt environment is not advised.) Ultimately a distinct bang and torque drop off will occur. Both engines were affected in the UH-2C but only one engine even stalled in the SH-3A. General Electric T58 experts believe that the lower continuous power demanded by the UH-2C is probably the significant difference. When the T58 is operating near its maximum power output, as in the SH-3A/D and the UH-2A/B, a compressor stall is not as likely.

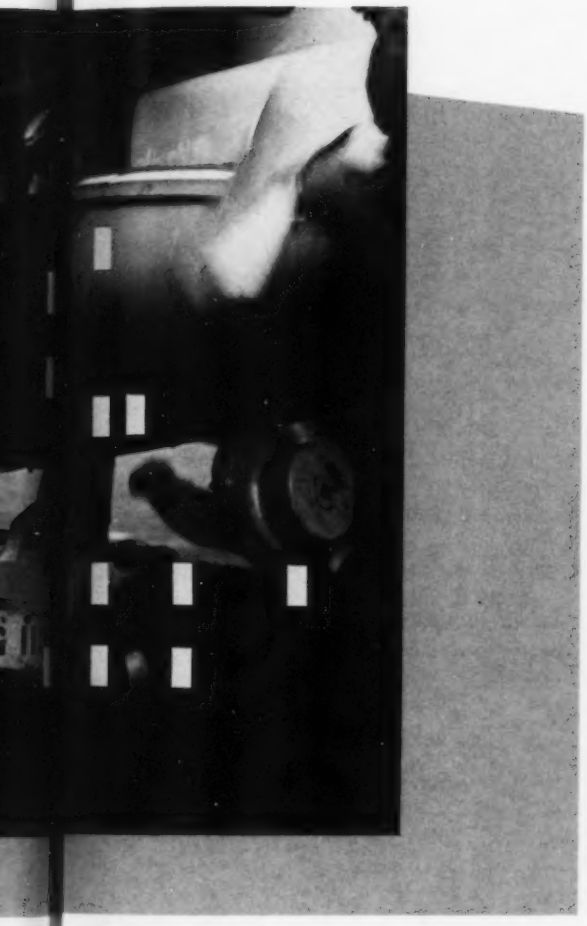
NavAirSysCom message 150013Z June 68, UH-2C Interim NATOPS Flight Manual Change No. 1. This message reiterates the danger of salt encrustation and the importance of engine wash. ◄

3M DATA



A Major Element in Design Improvement

Adapted from the Boeing Co., Publication, "A World of Experience."



NAVY 3M DATA – combined with Air Force 66-1 maintenance data, and supplemented with findings from related research and special studies by both Government and industry – is the backbone of a comprehensive *advanced aircraft systems design improvement effort.*

The degree of improvement contemplated can be better understood by a look at the goals being set for new military aircraft. These goals consistently call for a 50 percent or greater reduction in maintenance effort – which will require advances in maintainability state-of-the-art for all aircraft systems, as well as improvements in support concepts in order to significantly reduce inspection, servicing and rearming time. The ultimate goal is to improve the *supportability* of advanced aircraft systems. This means:

- The selection of design approaches proven to be satisfactory in the field.
- Avoidance of design features that have generated service problems.
- Development of support concepts based on approaches shown to be the most efficient for the intended operational environment.

The improvement of aviation safety is inherent in the improvement of aircraft supportability. Nevertheless, the manner in which 3M and AFM 66-1 data is now being systematically processed promises dramatic – and often direct – improvements in aviation safety.

How the Data is Processed

In 1964, the Navy and the Air Force authorized contractors to acquire 3M and AFM 66-1 data on non-company products in support of specific military contracts. As a result, the Boeing Company, under study contracts to apply military field experience to advanced aircraft systems development, initiated a *Field Experience Program* designed to extract the maximum benefit from this data.

Under this program, raw data is furnished by the military, usually in the form of magnetic tapes. It is processed, analyzed, verified and documented. Extensive use is made of electronic data processing at every stage. After documentation, it is evaluated and the findings are applied to research and design to enhance the safety, maintainability, reliability and logistic support of advanced aircraft systems. It is also important to note that findings suggest specific areas in which maintenance managers may concentrate their efforts, resulting in more significant improvements in maintenance man-hours, aircraft availability, and safety.

Program Has Broad Base

Navy aircraft studied included the A-6A, F-4B and A-4E, among others. The extent of processing and subsequent documentation for a given aircraft depends upon the applicability of its field experience to specific studies being conducted.

Other important experience data used is the statistical

and qualitative information obtained by field surveys of operational bases during the data verification process. Where possible, a field survey of operational bases is conducted for each aircraft model; and, since 1964, more than 20 military bases have been visited under this program.

In addition to establishing the correlation between statistical data and actual field experience, these visits establish a direct channel of communication between the crews operating and maintaining the airplane and personnel associated with aircraft system design. Questionnaires are used on problem components to interview crew chiefs, shop specialists, data analysts, pilots and other personnel associated with individual problems. The comments elicited are a unique contribution to the experience data, and thanks to the communication link provided by the survey, the comments get to the right people. The mechanic talks to the design engineer; the avionics specialist to the electronics engineer; and the pilot to the cockpit designer.

Typical Aircraft Documentation

Documentation of data is not an end in itself, but it is extremely important if the data collected is to be evaluated in a systematic manner. Typical documentation under the program consists of a 14-volume Field Experience Data Package which provides a complete set of operation and maintenance data for the aircraft, covering system, subsystem, and component levels. The 14 volumes include:

- A summary document.
- Six volumes of maintainability data.
- Six volumes of reliability data.
- A work unit code index.

The Application of Field Experience Data

Field experience data is used to identify maintenance and reliability problems requiring solution prior to the introduction of advanced designs. This application of field experience is accomplished through research to identify solutions to current problems, special studies related to new aircraft system requirements and direct design liaison to support design improvements. This data also provides a quantitative standard for comparison with research test results. Similar problems tend to occur in successive models and types of aircraft. To prevent this regeneration of problems, research is performed in specific support areas. Typical areas investigated are safety, accessibility and component effectiveness. Availability of valid field experience data enables research engineers to measure the severity of a problem in terms of established indices such as man-hours per flight hour and failure rates, and to evaluate the relative

Some Typical Field Comments

"Provide a head up display of slantrange distance to the target."

"Moisture is a general problem in the aircraft. The plane has little protection from condensation and resulting corrosion."

"The new self-test and fault indication equipment is effective only if it is more reliable than the system being monitored."

"Maintenance stands and ladders should be replaced by integral steps and platforms as much as possible."

"One of the basic problems of electronic integration is the need to 'marry' all components to close electronic tolerances."

"Technical manuals are especially important when we're troubleshooting a system. Good schematics and troubleshooting diagrams really help."

"Provide self-contained engine starters."

"Engine mounted accessory components, such as pumps and valves, should be located where they can be replaced without removing the engine."

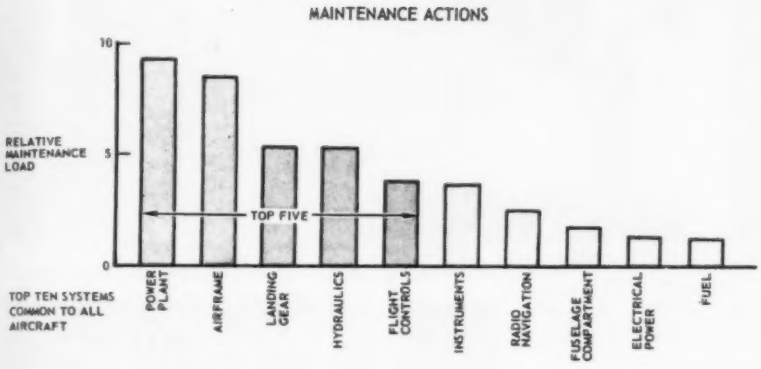
"Mount guns in airframe structure and as close to the centerline of the aircraft as possible for better accuracy."

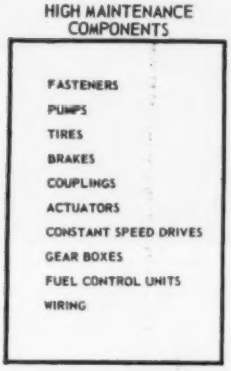
"Altimeter with large graduations is needed for easy reading during low level flights."

"A more comfortable seat with retractable armrests and with lay-down features for short duration high G maneuvers is needed."

"Flightline electronics support equipment should be lighter and easier to handle. One 'suitcase tester' requires four men to carry it. Complex electronics test and ground handling equipment requires its own maintenance program."

"Servicing and inspections would be easier if fuel and hydraulic valves and filters were more centrally located."





improvement offered by new design approaches.

Statistics from actual field experience on hardware items are also used to predict probable support requirements on similar hardware items being considered for use on new aircraft. For example, field experience data on maintenance tasks, task time, maintenance frequency, skills and ground support equipment can be used in predicting quantitative support requirements for proposed aircraft models.

An impressive array of findings has resulted from evaluation of documented data. These findings will have great applicability to the design and manufacture of new advanced systems, as already indicated. Many of these findings, however, also have a potential for more immediate application by Navy maintenance managers, even at the local level. Some of the significant findings are discussed below.

Aircraft Accident Rates

Relating accident rates of three models of aircraft to the total number of sorties instead of the conventional cumulative flight hours criteria results in a change in relative rates between models of aircraft. For example, the ratio between bomber and fighter accident rates is reduced from 23 to 1 to approximately 4 to 1 when based on sortie length. Also, bomber rates exceed transport rates when based on sortie length. The difference occurs because of the higher risks of accidents during the takeoff and landing phases of flight for all aircraft. Study of accident statistics indicate that other factors such as approach speed, altitude and type of mission also affect accident rates, but to a lesser degree than the number of takeoffs and landings.

Aborts and accidents. A study of ground and air aborts on various aircraft reveals that seven of the common systems account for 75 percent of all aborts. These seven systems are all primarily mechanical and three of them, powerplant, landing gear, and flight controls account for nearly 50 percent of the total.

Relating major aircraft accidents to air aborts indicates large, low performance, multiple engine aircraft have one major accident for each 200 to 350 air aborts, while high performance aircraft have one major accident for each 60 to 80 air aborts. Factors contributing most to this variation appear to be landing approach speeds and number of engines. Single-engine, high-performance aircraft have the highest accident/abort ratio. The accident/abort correlation seems to indicate that the types of failures that frequently cause aborts are also the types that contribute to or initiate the cause of major accidents.

Maintenance Actions

Evaluation of field experience on systems common to all types of aircraft indicate that five primarily mechanical systems generate the major portion of maintenance on military aircraft. Together, these systems represent approximately 50 percent of all system maintenance expended on fighter, bomber and transport aircraft. Studies further indicate that, within

these five systems, 10 basic items including fasteners, pumps, couplings, tires and brakes are the major offenders.

• *Fasteners.* Of the several nuisance-type problems prevalent on all aircraft, fasteners appear to be the greatest, accounting for the highest percentage of failures and man-hours expended. Although some of these failures represent loose or missing rivets, a large percentage related to access panel fasteners. For some large aircraft, as many as 3800 fasteners are removed and replaced during periodic inspections. These fasteners have many variations in head types, requiring the use of several different tools.

Data analysis shows that approximately one-half of the airframe failures and man-hours can be traced to fasteners. Research studies conclude that application of proper design criteria to access panel fasteners can reduce component removal and replacement by more than 50 percent. The man-hours spent removing and replacing fasteners are influenced by height above the ground, type of recess, standardization of tools and fasteners, antiseize compound, and length and diameter of bearing surfaces. Laboratory tests are being conducted to establish fastener techniques for securing access panels.

• *Tire life.* In general, tire life follows an established pattern of decreasing life with increasing landing speeds and tire pressures. However, analysis of results indicate that operating environments imposed by different commands result in significant variations in tire life on the same model aircraft. For example, main landing gear tire life on transport aircraft is much lower for tactical than for strategic airlift operations. The most significant factor appears to be the unprepared strips frequently used in tactical operations as opposed to the runways normally used in strategic operations.

• *Brakes.* Field data analysis resulted in the consideration of brake overheat detection devices for advanced aircraft. The data showed a significant number of wheel and brake system fires on bomber, tanker and jet transport aircraft. The present technique of depending on ground or tower personnel to notice an overheat condition results in random detection. An onboard brake condition sensor could alert the pilot to the hazardous overheating before it progresses to the point where thermal fuses blow or ignition occurs. He could then alleviate the conditions by obtaining cooling equipment if on the ground or by extending the gear if airborne.

Troubleshooting

A study of maintenace man-hours expended on system and component troubleshooting indicates that electronic systems consume approximately two-thirds of the total troubleshooting man-hours while consuming only one-fourth of the total maintenance. The remaining troubleshooting man-hours are nearly equally divided between electromechanical and mechanical systems. Electronic maintenance expenditures are compounded by the usual absence of visible evidence of failures, which increases the probability of removing an item that will later be determined serviceable. Also, elapsed time available for troubleshooting during short turnarounds tends to increase the number of serviceable items removed during system troubleshooting.

Airborne test and checkout. Both inspection and troubleshooting maintenance man-hours can be reduced by an airborne test and checkout system. Methodology is being developed to select meaningful aircraft system parameters to be measured, considering mission and deployment requirements. Application of this method to a hypothetical 1970-75 aircraft employing a test and checkout system for avionic, electrical power, and propulsion systems shows that a 23 percent decrease in maintenance man-hours and a 13 percent increase in aircraft availability are possible. Mockup testing has been conducted to provide the know-how needed to tie in an AIDS (Advanced Intergrated Data System) into the primary instrumentation systems without causing reliability degradation in case of malfunction in the AIDS equipment. These studies will assist in determining early in the development cycle the optimum degree of airborne test and checkout for advanced aircraft.

Foreign Object Damage

Study of engine removals due to FOD (foreign object damage) indicated that a definite correlation exists between removal frequency and aircraft model. For example, fighter aircraft have a FOD failure rate nearly double that for bomber aircraft. Reports on fighters tend to indicate that the forward part of the fuselage contributes a large percentage of the foreign material. Nuts, bolts, and other loose material in the forward compartment bays, in addition to fasteners, access panels, and other objects mounted on the forward fuselage, work loose and find their way into engine inlet areas. This trend appears to be substantiated by the fact that aircraft with low-slung, pod-mounted engines show lower FOD rates than those having wing or fuselage mounted inlets. As in the case of tire life, runway surfacing appears to significantly affect foreign object damage rates.

Bearing Lubrication

Lifetime-lubricated bearings are being recommended for advanced flight control systems based on field experience data. Data from maintenance of a comparable fighter currently in use revealed that 285 out of 910 periodic inspection requirements were lubrication tasks. Incorporation of new bearings could significantly reduce predicted maintenance expenditures over the life of the aircraft.

Component Comparisons

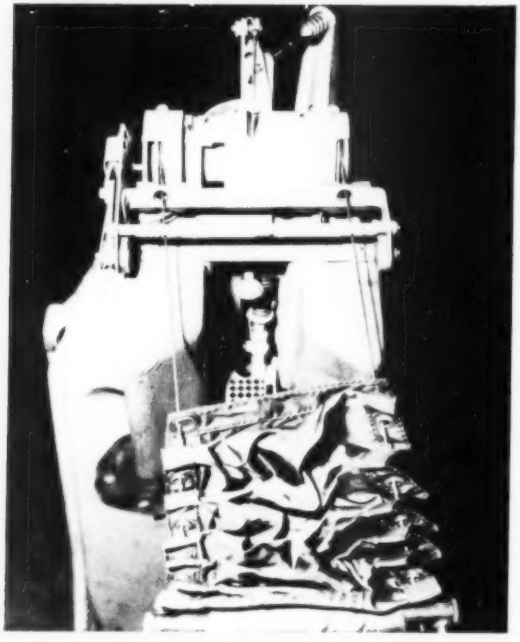
In addition to evaluating operating experience on the overall aircraft and individual systems, comparison studies are made on individual components performing similar functions on different model aircraft. Results indicate instances where the same or similar components perform differently under different operational environments. This trend is reflected by variations in component failure rates for specific aircraft applications. For example, the failure rate for a voltage regulator for one fighter aircraft installation is 700 percent higher than its normal trend in all other aircraft. Similarly, the failure rate for a constant speed drive, as installed on a certain transport aircraft, was 70 percent less than its normal trend on all other installations. These exceptions suggest areas where additional improvements are potentially available.

Summary

Results from the field experience program to date have been encouraging. Navy 3M and Air Force 66-1 programs appear to offer a good data source for identifying current problems as well as future trends impacting on aircraft maintenance. Use of this information to guide advanced system research will permit design solutions to be developed prior to the time they are needed for engineering development. It is anticipated that across the board application of field experience to research and development of a new aircraft system could reduce total program costs as much as 20 percent. ◄

MURPHY'S LAW*

ESCAPAC Ejection Seat Murphy



WRONG: Face curtain installed INCORRECTLY, with large grommets forward of the bracket assembly. WARNING: This arrangement will not provide windblast protection to occupant's face during ejection.

RIGHT: Face curtain installed PROPERLY, with large grommets on back side of bracket assembly.

DURING INSPECTION of an A-4C ESCAPAC ejection seat, in conjunction with the investigation of an aircraft accident, the rearmost fold of the face curtain, PN 3820147-501, was found to be incorrectly installed. The large grommets on the face curtain were installed *forward* of bracket assembly, PN 5678543-15, instead of *behind* it. The correct installation is illustrated above, and in figure 14-8 of NavWeps 01-40AVB-2-14.

Incorrect installation of the face curtain, as cited here, will not provide momentary restraint of the rear edge of the face curtain, which is necessary for protection of the seat occupant against windblast during the initial phase of emergency egress.

It is also to be noted that a visual inspection of this area of the seat assembly cannot be accomplished after the cover, PN 5678364-3, is installed.

F-4J Manufactured Murphy

DURING turnup prior to the first flight of an F-4J after installation of a rain removal valve, the pilot noticed rain removal hot air blowing over the windscreen

with the rain removal switch in the LOW position. The air flow did not change when the rain removal switch was moved to NORMAL.

An operational check of the rain removal system revealed the rain removal valve was being powered to *open* rather than to *close* with the switch in NORMAL position.

Further troubleshooting, utilizing a wiring data diagram (fig 3-13 of NavAir 01-245FDB-2-10.5) indicated that 28 vdc is required at pin B of plug C-200, wire No. M17A20, to *close* the valve. The proper voltage was present at this point, but with the valve connected to system rain removal, the valve was *opening*.

A bench check revealed that the valve would *open* when 28 vdc was applied to pin B and *close* when 28 vdc was applied to pin A. After reversing wires to pins A and B and to pins C and D, the valve functioned properly and was reinstalled in the aircraft. The rain removal system then functioned properly.

It was concluded that the hot air shutoff valve assembly had been miswired internally by the manufacturer.

SP-2H Jet Engine Fire Warning Murphy

TROUBLESHOOTING of the jet engine fire warning system on one SP-2H has disclosed that the fire warning lights and test switch were connected in reverse. This apparently occurred during incorporation of AFC 920.

Because the test switch was installed backwards and mislabeled, the jet fire warning test appeared normal. When, actually, circuits tested were opposite those desired and an actual fire on the port jet would have caused the fire warning light for the starboard engine to illuminate and vice versa. A one time check of all aircraft in this particular squadron revealed no other discrepancies. This discrepancy may be checked by grounding the temperature switch on either jet engine fire warning element and noting illumination of the proper warning light.

Helo Circuit Breaker Murphy

ON THE first flight on an SH-3A aircraft following replacement of the MX-3272 dc motor circuit breaker, PN 1047175, a crewman noticed smoke coming from the area around the sonar reeling machine. Inspection showed that the dc motor current limiter located in the electronics compartment was blown. A new one was installed. Upon applying power to the aircraft, smoke was again noticed coming from the area of the sonar reeling machine.

Investigation revealed that the two leads going to the dc motor circuit breaker were reversed. The 28 vdc line was connected to the ground line which put 28 vdc directly to the motor. The 28 vdc found a ground through the hydraulic pressure input line to the sonar reeling machine. This caused the hydraulic line to burn.

The MX-3272 is marked positive for the hot lead but the electrical leads themselves are not marked. Both leads have red rubber covers on them. It has been recommended that the leads be identified by marking the 28 vdc lead with a red cover and the ground lead with a black cover.

UH-2 Generator Murphy

AMD LAKEHURST reports an instance where the AC generator, PN 28E19-41B, failed during the flight of a UH-2 aircraft. Subsequent investigation revealed that the outer race bearing retainer, PN 1322943, can be installed backwards (refer to Handbooks of Overhaul Instructions; item 84, figure 2-1 of NavWeps 03-5AA-89 or item 96, figure 1, NavWeps 03-5AA-90). This condition leads directly to failure of the forward bearing armature and field assembly. AMD Lakehurst indicated that neither Handbook of Overhaul Instructions explains how the bearing retainer should be installed.

NavAirSysCom advises that action is being taken to revise the applicable handbooks to incorporate instructions for proper installation.

A-4E Smoke Abatement System Murphy

ON POSTFLIGHT, a fuel leak was found in the engine compartment. After investigation, the leak was traced to the solenoid-operated normally closed shutoff valve assembly, PN 36010 (illustrated as item 53, figure 25B, on page 60D of NavAir 01-40AVC-4-2). The solenoid was found to be improperly mounted to the shutoff valve body. In addition, the O-ring between the solenoid and the valve body was torn due to improper mounting and the solenoid flange was warped and cracked.

Further investigation revealed that the check valve assembly, PN 230A2PP15 (illustrated as item 66, figure 25B, on page 60D of NavAir 01-40AVC-4-2), was installed backwards, allowing fuel to enter the additive tank, PN 5826565. A one time inspection of all aircraft incorporating AFC 382 was recommended in order to insure proper installation. ◄

* If an aircraft part can be installed incorrectly, someone will install it that way!

LETTERS

It's what you learn after you know it all that counts.
Anon.

QNH

NAF NAPLES – The weather people here say that estimated altimeter settings for destination and alternate will be given if requested. The FLIP Planning Section states, "ASW forecasters are entering forecast altimeter settings (QNH) for destination and alternate on the flight plan." Suggest all Navy weather briefs should include estimated altimeter settings for use in the event of two-way radio failure.

● For your info and for others who are not familiar with the reference used above there is a word of caution that the forecast QNH is not to be used except in the absence of a current altimeter setting. In other words it is better than nothing but that's all. In view of that it does not seem worthwhile as a mandatory briefing item. If you want it just ask for it.

Where the Yellow Comes From

NATC PAX RIVER – Your Forum in the May 68 issue attempted to explain "Where the Yellow Comes From" on certain airborne accessories. Here are additional reasons:

a. At the Naval Air Test Center (and probably other RDT&E activities), certain accessories are specially instrumented to obtain specific technical data. These accessories are identified by painting them yellow to prevent their being confused with uninstrumented like items.

b. Upon transfer of an aircraft to the NARF for PAR, it is not always feasible to remove such instrumented assets since supply system assets are of a limited nature and cannot be obtained in time to meet the PAR schedule.

c. Return of an aircraft to NATC upon completion of PAR with such instrumented accessories is always requested; however, in the complicated process of restoring aircraft to "new" service many lose their identity to a specific airframe and become part of the Component Rework Schedule. The special instrumentation is removed and the asset is overhauled in the normal process and reidentified as a standard item. Thus, black paint will be used to cover the original yellow.

A program is underway at NATC to recover as many of these lost instrumented assets as possible.

As you pointed out in your article, such assets should be perfectly acceptable for reinstallation after NARF rework.

LT A. E. HARPER, SC

● Your help in clarifying this issue is appreciated. At the same time we hope that the publishing of this information will aid NATC in recovering these hi-value assets.

SAR Problem

FPO SAN FRANCISCO – Discussion with the local rescue people has indicated that judicious use of helicopter downwash is an accepted technique for temporarily keeping flames away from the crew of a burning aircraft.

Now that the F-4, among other aircraft, has a seat with zero-zero capability, one can easily construct a situation where ejection might be the preferred egress method from a burning aircraft, even when stationary.

I would suggest that rescue helo pilots be cautioned against use of this technique on the F-4 aircraft unless the crew is clearly incapacitated.

LCDR C. P. ELLIOTT
ASO,FITRON 142

● You are right. Even though there are only a few types with zero-zero capability, other models will have this capability soon. SAR helo crews will have to add this precaution to rescue techniques.

Destroyermen Briefing

NORFOLK – The average destroyerman is not familiar with all the different kinds of survival equipment worn by naval aviators and aircrewmen. Is there any way that personnel assigned to rescue details aboard destroyers can be briefed or indoctrinated on this equipment to eliminate potential problems in motor whaleboat or over-the-side rescues?

DESTROYERMAN

● The machinery for a program of continual training of rescue crews aboard plane guard destroyers by aviation personnel exists. Instructions are in effect on the subject such as ComNavAirLant Instruction 3730.3, Pilot Rescue Briefings for Plane Guard Destroyer Personnel, 28 May 1962; and ComNavAirPac Instruction 3500.29A, Pilot Rescue Briefings for Plane Guard Destroyer Personnel, 13 Aug 1965. ComCruDesLant Instruction 3505.4A, Rescue Destroyer Plan, 1 March 1966, and ComCruDesPac Instruction P3130.2A, Search and Rescue Guide, Rev Oct 1963, are also pertinent.

Both the ComNavAirPac and ComNavAirLant instructions establish pilot rescue briefing teams aboard carriers. These teams brief personnel

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assigned to rescue details on plane guard destroyers concerning aviators' equipment which may be encountered during rescue operations and on helicopter/destroyer rescue procedures as appropriate.

To quote excerpts from ComNavAirPac Instruction 3500.29A: "Where practicable during in-port periods, commanding officers of CVA/CVS shall schedule briefings for the plane guard destroyer personnel who will be assigned to open-sea pilot rescue details. These briefings shall be conducted by a team consisting of the Air Wing/Group survival officer, the senior helicopter pilot and other pilots as necessary to realistically demonstrate all types of aviator equipment in use by the Wing/Group . . . Emphasis shall be placed on teaching rescue personnel the removal techniques of parachutes and oxygen masks/faceplates as well as procedures contained in ComNavAirPac Open-sea Pilot Rescue Procedures (enclosure 1 to the instruction). In addition to the action indicated above, separate briefings shall be prepared and made available to acquaint Destroyer Commanders and CIC personnel with the actual equipment used by Air Wings/Groups to facilitate location of downed aviators . . . Considering the wide variety of aviator equipment now in use and contemplated for the future, plus the rotation of personnel assigned to rescue details, in-port training periods should be conducted at every opportunity. To supplement the demonstration of in-use equipment, it is planned to make kits of surveyed aviator equipment available to ComCruDesPac for use by destroyers in pilot rescue drills while at sea. It is suggested that when practical, carrier commanding officers make available an aviator who is qualified in survival equipment and techniques to assist the Destroyer Commander in the conduct and evaluation of these drills."

ComCruDesLant Instruction 3505.4A states in part, "Destroyer commanding officers will insure that officers and men assigned rescue responsibilities are familiar with this Rescue Destroyer Plan. In particular, they will insure that personnel assigned rescue stations receive aeronautical equipment briefings by aviation personnel every six months . . ."

ComCruDesPac Instruction P3130.2A requires personnel assigned to rescue teams to attend "Pilot Rescue Briefings" frequently. Briefing teams are available in all NavAirPac carriers, the instruction points out, and jet series aircraft briefings may be obtained by contacting the Station Safety Officer at NAS Miramar.

Destroyermen are concerned with their crews' lack of familiarity with naval aviators' and aircrewmen's equipment. As potential rescuees, it behooves naval aviation personnel to continue to spread the word.

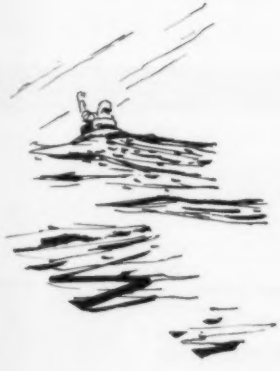
Famous Last Words

We'll let down through this hole.

A Midair Can Spoil Your . . .

NAS IMPERIAL BEACH – An SH-3A on a night training flight was proceeding to NAS North Island. Weather throughout was marginal VFR but at times definitely IFR. *(The Anymouse does not say if the pilot was on an IFR flight plan. – Ed.)* San Diego Approach was contacted and clearance granted for a tacan No. 1 approach with GCA pickup on final. The pilot, flying from the left seat, cleared the area to his left. Just as GCA started the talk-down a civilian aircraft was spotted on the port beam, closing and about 100 ft below. The civilian aircraft did not alter course or take evasive action. The SH-3A had all exterior lights bright and operating. No evasive action was taken because "it was too late by the time I saw him."

● **The only CAS (collision avoidance system) in use is the Mk I eyeball.** *Man, keep up that swivel!*



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CONTENTS

1 Wild Cats
By Col J. H. Reinburg USMC (Ret)
5 Bibb's Uncontestable Modern Laws of Aviation
By Ben Bibb
6 A Review of Collision Avoidance Systems
8 An Evening Patrol
12 Planning for the Unplanned
15 Persistence Pays
16 Rotor Vortex
18 Close Call
24 Points of View
26 So What's for Lunch?
29 Rescue Report
36 SLUR-R-R-R-P-P-P-Pft
38 3M Data

DEPARTMENTS

10 Short Snorts
20 Anymouse
22 Forum
33 Flight Surgeon's Notes
44 Murphy's Law
46 Letters
IBC CNO Award Winners

NavAir 00-75-510

CREDITS

Cover Painting by Craig Kavafes shows the Navy's new EA-6B in action. Courtesy Grumman Aircraft Corp, Bethpage, Long Island, New York.

Pg. 8 Photo by PH1 Dan Dodd

Pg. 35 Cartoon by Hargreaves Courtesy RNZAF Flight Safety

Pg. 42 Photos (Middle, Right, Lower) by PHAN D. A. Wilding, VP-21

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Next Month

The Iceman Cometh

and other items of interest to the Naval Aviator.

CNO AWARD WINNERS

COMNAVAIRLANT

VF-33
VA-45
VA-75
VA-172
VAQ-33
VS-24
HC-2
VP-5

CGFMFLANT

VMFA-451
HMM-264
VMGR-252

CGFMFPAC

VMCJ-3
VMGR-152
VMFA-314
HML-367

COMNAVAIRPAC

VF-213
VF-124
VA-192
VQ-1
VS-35
HS-4
VP-2
VX-4

CNATRA

HT-8 (Basic)
VT-31 (Advance)
VF-673 (CNARESTRA)
VP-662 (CNARESTRA)
HS-822 (CNARESTRA)
VR-662 (CNARESTRA)

CGMARTC

VMF-112
VMR-216

ADMIRAL JAMES H. FLATLEY MEMORIAL AWARD WINNERS FOR AVIATION SAFETY

CVA
USS Saratoga

LPH
USS Iwo Jima

CVS
USS Bennington

NT
NT
NT